AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER 1/8
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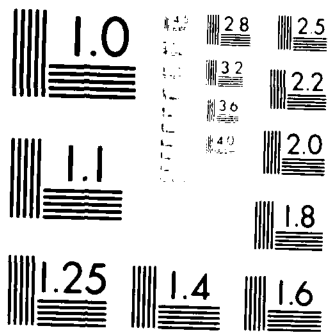
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REPORT NO. ADCR-85-1
Volume III, Part 2 of 2

ESP — A PILOT COMPUTER PROGRAM FOR DETERMINING FLUTTER-CRITICAL EXTERNAL-STORE CONFIGURATIONS

VOLUME III — PROGRAM COMPILATION PART 2 OF 2

February 1985

Prepared Under Contracts N00019-81-C-0395 and N00019-84-C-0123

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DEPARTMENT OF THE NAVY
AIR SYSTEMS COMMAND

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Report No. ADCR-85-1
Volume III, Part 2 of 2

ESP - A PILOT COMPUTER FOR DETERMINING FLUTTER-CRITICAL EXTERNAL-STORE CONFIGURATIONS

Volume III – Program Compilation,
Part 2 of 2, which follows Volume III - Program Compilation, Part 1 of 2,

John B. Smedfjeld

February 1985

Prepared under Contracts N00019-81-C-0395
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by

GRUMMAN AEROSPACE CORPORATION
Bethpage, New York 11714

for

NAVAL AIR SYSTEMS COMMAND
Washington, D.C. 20361

```
              SUBROUTINE EVOVLE (BETA,ESR,EL,XI,YI,KK,IM,ENDX,KEND,ES)     EVOVLE    2
        C                                                                  EVOVLE    3
              DIMENSION       CLEX(20) ,     CTEX(20) ,     CLEY(20)       EVOVLE    4
              DIMENSION       CTEY(20) ,      XW(350) ,      YW(350)       EVOVLE    5
              DIMENSION        XD(250) ,      YD(250) ,      AW(350)       EVOVLE    6
              DIMENSION        AD(250) ,      XLE(50) ,      XTE(50)       EVOVLE    7
              DIMENSION        XMS(50) ,    XTEML(50) ,      ISS(50)       EVOVLE    8
              DIMENSION         XAT(5) ,       XAL(5) ,         F(5)       EVOVLE    9
              DIMENSION        NWBT(5) ,       ASR(5) ,      XMAX(5)       EVOVLE   10
              DIMENSION       IND(350) ,      BXW(50) ,     NCLER(5)       EVOVLE   11
              DIMENSION       NCTER(5) ,       ESR(5) ,  CLEXR(20,5)       EVOVLE   12
              DIMENSION    CLEYR(20,5) ,  CTEXR(20,5) ,  CTEYR(20,5)       EVOVLE   13
              DIMENSION          LS(5) ,        XI(5) ,        YI(5)       EVOVLE   14
              DIMENSION       THET(20) ,       CT(20) ,       SN(20)       EVOVLE   15
              DIMENSION        BXE(20) ,       AY(20)                      EVOVLE   16
              DIMENSION ITAPES(50)                                         EVOVLE   17
              COMMON / CTAPES / ITAPES                                     EVOVLE   18
              COMMON/TOMB/XW,YW,NDB,LS,XMAX,NWB,AD,XD,YD,IND,AW             EVOVLE   19
              COMMON/IDIOT/CLEXR,CLEYR,CTEXR,CTEYR,NCLER,NCTER,NS          EVOVLE   20
              COMMON/OLIVER/CLEX,CLEY,CTEX,CTEY,NWBT,ASR                   EVOVLE   21
              COMMON /BXLL  / BEX(5)                                       EVOVLE   22
              COMMON /BOXS/ BEL , BSR                                      EVOVLE   23
              INTEGER OVRLAP                                               EVOVLE   24
              LOGICAL SET,SETT,SAT                                         EVOVLE   25
        C                                                                  EVOVLE   26
        C                                                                  EVOVLE   27
              ITAPER = ITAPES(5)                                           EVOVLE   28
              ITAPEW = ITAPES(6)                                           EVOVLE   29
              MTAP3  =  ITAPES(23)                                         EVOVLE   30
        C                                                                  EVOVLE   31
        C                                                                  EVOVLE   32
              BXEL  =  BEX(KK)                                             EVOVLE   33
              READ (ITAPER,98) NCLER(KK) , NCTER(KK) , NWBT(KK)            EVOVLE   34
              NCLE=NCLER(KK)                                               EVOVLE   35
              NCTE=NCTER(KK)                                               EVOVLE   36
              READ (ITAPER,99) (CLEXR(I,KK),CLEYR(I,KK), I=1,NCLE)         EVOVLE   37
              READ (ITAPER,99) (CTEXR(I,KK),CTEYR(I,KK), I=1,NCTE)         EVOVLE   38
              XREF = 0.0                                                   EVOVLE   39
              DO 724 I=1,NCLE                                              EVOVLE   40
              IF (CLEXR(I,KK).GE.XREF) GO TO 724                           EVOVLE   41
              XREF = CLEXR(I,KK)                                           EVOVLE   42
          724 CONTINUE                                                     EVOVLE   43
           75 SLE    =  0.0                                                EVOVLE   44
              DO 100 I=2,NCLE                                              EVOVLE   45
              DELY = CLEYR(I,KK) - CLEYR(I-1,KK)                           EVOVLE   46
              XAVE = (CLEXR(I,KK) + CLEXR(I-1,KK))/2.0 - XREF              EVOVLE   47
          100 SLE = SLE + DELY*XAVE                                        EVOVLE   48
              STE = 0.0                                                    EVOVLE   49
              DO 101 I=2,NCTE                                              EVOVLE   50
              DELY =  CTEYR(I,KK) - CTEYR(I-1,KK)                          EVOVLE   51
              XAVE = (CTEXR(I,KK) + CTEXR(I-1,KK))/2.0 - XREF              EVOVLE   52
          101 STE = STE + DELY*XAVE                                        EVOVLE   53
              AREA = STE - SLE                                             EVOVLE   54
              ANWB   =  NWBT(KK)                                           EVOVLE   55
              ASR(KK) = SQRT(AREA/ANWB)/12.0                               EVOVLE   56
              ESR(KK) = ASR(KK)*SQRT(BETA)                                 EVOVLE   57
              EL=1./BETA                                                   EVOVLE   58
```

```
      NCLE  =  NCLER(KK)
      ABX  =  CLEYR(NCLE,KK) / (ESR(KK)*12.0*EL)
      NBX  =  ABX
      IF ( AMOD(ABX,1.0) .GE. 0.5 )     NBX = NBX + 1
      ESR(KK)  =  CLEYR(NCLE,KK) / FLOAT(NBX)
      ESR(KK)  =  ESR(KK) / (12.0*EL)
      ES  =  ESR(KK)
      EL=1./BETA
      XES = ES*12.0
      XEL = XES*EL
      XIN = ES*6.0
      XAR = XES*XEL
      NCLE=NCLER(KK)
      NCTE=NCTER(KK)
      IF (BXEL.EQ.0.) GOTO 61
      NCLES = NCLE - 1
      DO 62 I = 1,NCLES
      DY = CLEYR(I+1,KK) - CLEYR(I,KK)
      DX = CLEXR(I+1,KK) - CLEXR(I,KK)
      THET(I) = ATAN2(DY,DX)
      IF (THET(I).LT.0.0) THET(I) = THET(I) + 6.283185307
      SN(I) = DX / DY
      BXE(I) = BXEL / SIN(THET(I))
   62 CT(I) = CLEXR(I,KK) - SN(I)*CLEYR(I,KK)
      AY(1) = CLEYR(1,KK)
      IF (NCLES.LT.2) GO TO 66
      DO 63 I = 2,NCLES
      IF (SN(I).NE.SN(I-1)) GO TO 64
      AY(I) = CLEYR(I,KK)
      GO TO 63
   64 AY(I) = (CT(I) - CT(I-1)) / (SN(I-1) - SN(I))
   63 CONTINUE
   66 DO 65 I = 1,NCLES
      AY(I) = AY(I) / (ES*EL*12.0)
   65 BXE(I) = BXE(I) / (ES*12.0)
      BEN = (BXEL + CLEYR(NCLE,KK)) / (ES*EL*12.0)

   61 DO 1  I = 1,NCLE
      CLEX(I)=CLEXR(I,KK)/(ES*12.0) - 0.5
    1 CLEY(I)=CLEYR(I,KK)/(ES*EL*12.)

      DO 2 I=1,NCTE
      CTEX(I)=CTEXR(I,KK)/(ES*12.0) - 0.5
    2 CTEY(I)=CTEYR(I,KK)/(ES*EL*12.)

      ENDY  =  AINT (CLEY(NCLE) + 0.5)
      CLEY(NCLE)  =  ENDY
      CTEY(NCTE)  =  ENDY

C FIND LARGEST X ON TRAILING EDGE

      ENDX = 0.0
      DO 3 I=1,NCTE
      XX=CTEX(I)
    3 ENDX=AMAX1(ENDX,XX)

C FIND SMALLEST X ON TRAILING EDGE
```

```
      STEX=ENDX
      DO 4 I=1,NCTE
      XX=CTEX(I)
    4 STEX=AMIN1(STEX,XX)

C FIND LARGEST X ON LEADING EDGE

      BLEX=0.0
      DO 6 I=1,NCLE
      XX=CLEX(I)
    6 BLEX=AMAX1(BLEX,XX)

C CALCULATE LEADING EDGE LINE

      NCLES=NCLE-1
      Y=0.
      DO 8 J=1,NCLES
      IF(CLEY(J).EQ.CLEY(J+1)) GO TO 8
      IF(Y+.5.GT.CLEY(J+1)) GO TO 8
    7 K=Y+1.
      XLE(K)=CLEX(J)-(CLEX(J)-CLEX(J+1))*(Y+.5-CLEY(J))/
     1      (CLEY(J+1)-CLEY(J))
      Y=Y+1.
      IF(CLEY(J+1)-(Y+.5)) 8,7,7
    8 CONTINUE

C CALCULATE TRAILING EDGE LINE

      NCTES=NCTE-1
      Y=0.
      DO 10 JJ=1,NCTES
      IF(CTEY(JJ).EQ.CTEY(JJ+1)) GO TO 10
      IF(Y+.5.GT.CTEY(JJ+1)) GO TO 10
    9 K=Y+1.
      XTE(K)=CTEX(JJ)-(CTEX(JJ)-CTEX(JJ+1))*(Y+.5-CTEY(JJ))/
     1       (CTEY(JJ+1)-CTEY(JJ))
      Y=Y+1.
      IF(CTEY(JJ+1)-(Y+.5)) 10,9,9
   10 CONTINUE

C CALCULATE LEADING EDGE MACH LINES THAT HAVE SMALLEST X-VALUES

      IRS=1
      Y=0.
      GO TO 12
   11 Y=Y+1.
   12 K=Y+1.
      XMS(K)=ENDX
      DO 13 J=1,NCLE
      XMK=ABS(Y-CLEY(J)+.5)+CLEX(J)
      XMSK=XMS(K)
   13 XMS(K)=AMIN1(XMSK,XMK)
      IF (BXEL.EQ.0.) GOTO 23
C     ------ BOX ELIMINATION AT LEADING EDGE -----------
      IF (Y+0.5.LE.CLEY(NCLE)) GO TO 24
      KAA = NCLE - 1
```

```
      KAB = NCLE                                                         EVOVLE
      XQE = CLEX(KAA) - (CLEX(KAA)-CLEX(KAB)) * (Y+O.5-CLEY(KAA)) /      EVOVLE
     1 (CLEY(KAB) - CLEY(KAA))                                           EVOVLE
      IF (XMS(K).GE.XQE) GO TO 23                                        EVOVLE
      IBNX = XQE - XMS(K)                                                EVOVLE
      IF (IBNX.GT.BXE(NCLE-1)) XMS(K) = XQE - BXE(NCLE-1)                EVOVLE
      GO TO 23                                                           EVOVLE
   24 IF (NCLES.GT.1.AND.Y+O.5.GE.AY(2)) GO TO 25                        EVOVLE
      X22 = XLE(K) - BXE(1)                                              EVOVLE
      IF (XMS(K).LT.X22) XMS(K) = X22                                    EVOVLE
      GO TO 23                                                           EVOVLE
   25 DO 26 I = 1,NCLES                                                  EVOVLE
      IF (Y+O.5.GE.AY(I).AND.Y+O.5.LT.AY(I+1))  GO TO 27                 EVOVLE
   26 CONTINUE                                                           EVOVLE
      X22 = XLE(K) - BXE(NCLES)                                          EVOVLE
      GO TO 35                                                           EVOVLE
   27 X22 = XLE(K) - BXE(I)                                              EVOVLE
   35 IF (XMS(K).LT.X22) XMS(K) = X22                                    EVOVLE
                                                                         EVOVLE
C CALCULATE TRAILING EDGE MACH LINES THAT HAVE LARGEST X-VALUES          EVOVLE
                                                                         EVOVLE
   23 XTEML(K) = O.O                                                     EVOVLE
      DO 14 JJ=1,NCTE                                                    EVOVLE
      XTEMK=CTEX(JJ)-ABS(Y+.5-CTEY(JJ))                                  EVOVLE
      XTEMLK=XTEML(K)                                                    EVOVLE
   14 XTEML(K)=AMAX1(XTEMLK,XTEMK)                                       EVOVLE
                                                                         EVOVLE
      IF(Y+.5.LE.ENDY.AND.XTEML(K).GE.XMS(K)) GO TO 11                   EVOVLE
      IF(Y+.5.LE.ENDY) GO TO 732                                         EVOVLE
      GO TO 733                                                          EVOVLE
  732 IF(IRS.EQ.1) BIGY=Y                                                EVOVLE
      IRS=2                                                              EVOVLE
      GO TO 11                                                           EVOVLE
                                                                         EVOVLE
C FIND THE Y-RANGE OF BOTTOM DIAPHRAGM                                   EVOVLE
                                                                         EVOVLE
  733 IF (BXEL.NE.O.O.AND.Y+O.5.GE.BEN) GOTO 201                         EVOVLE
      IF (XTEML(K).GE.XMS(K)) GO TO 200                                  EVOVLE
      GO TO 201                                                          EVOVLE
  200 ISS(K)=O                                                           EVOVLE
      IRS=1                                                              EVOVLE
      GO TO 11                                                           EVOVLE
                                                                         EVOVLE
C IF THERE IS A BOTTOM DIAPHRAGM, FIND ITS LARGEST Y-VALUE               EVOVLE
                                                                         EVOVLE
  201 IF(IRS.EQ.1) BIGY=Y                                                EVOVLE
      BOT=AMAX1(BIGY,ENDY-.5)                                            EVOVLE
                                                                         EVOVLE
C FIND SUBSONIC AND SUPERSONIC LOCATIONS ON LEADING AND TRAILING EDGES   EVOVLE
                                                                         EVOVLE
      KEND=ENDY+.5                                                       EVOVLE
      DO 15 K=1,KEND                                                     EVOVLE
      IF(XLE(K).GE.XMS(K).AND.XTE(K).LE.XTEML(K)) ISS(K)=-1              EVOVLE
      IF(XLE(K).LE.XMS(K).AND.XTE(K).LE.XTEML(K)) ISS(K)= 1              EVOVLE
      IF(XLE(K).GE.XMS(K).AND.XTE(K).GE.XTEML(K)) ISS(K)=-2              EVOVLE
      IF(XLE(K).LE.XMS(K).AND.XTE(K).GE.XTEML(K)) ISS(K)=2               EVOVLE
   15 CONTINUE                                                           EVOVLE
```

```
C SEE IF MAX-X ON LEADING EDGE IS GREATER THAN MIN-X ON TRAILING EDGE

      OVRLAP=0
      IF(BLEX+1..GE.STEX) OVRLAP=1

C INITIALIZE IW,ID,J,JJ,X,Y

      IW=0
      ID=0
      X=0.
   16 Y=0.
      J=1
      JJ=1
      TANLJ=TANL(1)
      TANTJJ=TANT(1)

   17 K=Y+1.
      IF(Y+.5.GT.ENDY) XTE(K)=0.
      IF(Y+.5.GT.ENDY) XLE(K)=ENDX+1.

C SEE IF BOX IS LOCATED ENTIRELY ON BOTTOM DIAPHRAGM

      IF(ISS(K).EQ.0.AND.Y.GE.ENDY.AND.X.GE.XMS(K).AND.X.LE.XTEML(K))
     1GO TO 1000

C SEE IF BOX IS LOCATED ENTIRELY ON WING

      IF(Y+1..LE.ENDY.AND.X-.5.GT.BLEX.AND.X+.5.LT.STEX
     1.AND.OVRLAP.EQ.0) GO TO 2000

C IF BOX TOUCHES NEITHER THE WING NOR THE DIAPHRAGM,BYPASS CALCULATIONS

      IF((X    .LT.XMS(K).AND.X+1..LT.XLE(K)).OR.(X-1..GT.XTE(K).AND.X
     1.GT.XTEML(K))) GO TO 3000


C DETERMINE WHETHER BOX IS CUT OR UNCUT
      SET=.FALSE.
      SETT=.FALSE.
      DO 55 N=1,5
      I=6-N
      S=5-I
      INT=1
      GO TO 45
   40 INT=2
   45 SSCALE=1.
      TSCALE=1.
      XLREF   =XLE(K)
      XTREF   =XTE(K)
      IF(J.LT.NCLES.AND.CLEY(J+1).LT.Y+.5.AND.CLEY(J+1).GT.Y)
     1XLREF=XLE(K-1)-4.*TANL(J)
      IF(JJ.LT.NCTES.AND.CTEY(JJ+1).LT.Y+.5.AND.CTEY(JJ+1).GT.Y)
     1XTREF=XTE(K-1)-4.*TANT(JJ)
      IF(Y+.25*S.GE.CLEY(J+1).AND.J.LT.NCLES) GO TO 600
      IF(SET) GO TO 604
      GO TO 601
```

```
      600 J=J+1                                                        EVOVLE   287
      604 IF(INT.EQ.2) TANLJ=TANL(J)                                   EVOVLE   288
          IF(INT.EQ.2) XLREF=XLE(K+1)+4.*TANLJ                         EVOVLE   289
          SET=.TRUE.                                                   EVOVLE   290
      601 IF(Y+.25*S.GE.CTEY(JJ+1).AND.JJ.LT.NCTES) GO TO 602          EVOVLE   291
          IF(SETT) GO TO 605                                           EVOVLE   292
          GO TO 603                                                    EVOVLE   293
      602 JJ=JJ+1                                                      EVOVLE   294
      605 IF(INT.EQ.2) TANTJJ=TANT(JJ)                                 EVOVLE   295
          IF(INT.EQ.2) XTREF=XTE(K+1)+4.*TANTJJ                        EVOVLE   296
          SETT=.TRUE.                                                  EVOVLE   297
      603 CONTINUE                                                     EVOVLE   298
                                                                       EVOVLE   299
          IF(CLEY(NCLE).LT.(Y+1.).AND.CLEY(NCLE).GT.(Y    )) GO TO 46  EVOVLE   300
          GO TO 48                                                     EVOVLE   301
       46 SSCALE=CLEY(NCLE)-Y                                          EVOVLE   302
          XLREF=CLEX(NCLE)+(CLEX(NCLE-1)-CLEX(NCLE))*SSCALE/           EVOVLE   303
         1(2.*(CLEY(NCLE)-CLEY(NCLE-1)))                               EVOVLE   304
       48 IF(CTEY(NCTE).LT.(Y+1.).AND.CTEY(NCTE).GT.(Y    )) GO TO 49  EVOVLE   305
          GO TO 50                                                     EVOVLE   306
       49 TSCALE=CTEY(NCTE)-Y                                          EVOVLE   307
          XTREF=CTEX(NCTE)+(CTEX(NCTE-1)-CTEX(NCTE))*TSCALE/           EVOVLE   308
         1(2.*(CTEY(NCTE)-CTEY(NCTE-1)))                               EVOVLE   309
                                                                       EVOVLE   310
       50 IF(INT.EQ.1) GO TO 40                                        EVOVLE   311
                                                                       EVOVLE   312
          T=I-3                                                        EVOVLE   313
          XAL(I)=XLREF+T*SSCALE*TANLJ                                  EVOVLE   314
          XAT(I)=XTREF+T*TSCALE*TANTJJ                                 EVOVLE   315
          F(I)=(SSCALE/12.)*(AMIN1(X+.5,XAT(I))-AMAX1(X-.5,XAL(I)))    EVOVLE   316
       55 IF(F(I).LE.O.) F(I)=O.                                       EVOVLE   317
                                                                       EVOVLE   318
          AREA=F(1)+4.*F(2)+2.*F(3)+4.*F(4)+F(5)                       EVOVLE   319
          IF(AREA.LT.1..AND.AREA.GT..9999) AREA=1.                     EVOVLE   320
          IF(AREA.LT..0001) AREA=O.                                    EVOVLE   321
                                                                       EVOVLE   322
C   BOX TURNS OUT TO BE EITHER UNCUT OR ENTIRELY OFF WING              EVOVLE   323
                                                                       EVOVLE   324
          IF(AREA.EQ.O.AND.((X.LE.XLE(K).AND.X.GE.XMS(K).AND.ISS(K).LE.O) EVOVLE   325
         1.OR.(X.GE.XTE(K).AND.X.LE.XTEML(K).AND.(IABS(ISS(K)).EQ.1.OR. EVOVLE   326
         2ISS(K).EQ.O)))) GO TO 1000                                   EVOVLE   327
                                                                       EVOVLE   328
C   BOX TURNS OUT TO BE EITHER CUT OR ENTIRELY ON WING                 EVOVLE   329
                                                                       EVOVLE   330
          IF(AREA.GT.O.) GO TO 18                                      EVOVLE   331
          GO TO 3000                                                   EVOVLE   332
       18 IW=IW+1                                                      EVOVLE   333
          IF (IW.GT.350) GOTO 22                                       EVOVLE   334
          AW(IW)=AREA                                                  EVOVLE   335
          XW(IW)=X                                                     EVOVLE   336
          YW(IW)=Y                                                     EVOVLE   337
          IND(IW)=1                                                    EVOVLE   338
          BXW(K)=X                                                     EVOVLE   339
                                                                       EVOVLE   340
C   BOX TURNS OUT TO BE CUT BY BOTTOM EDGE OF WING                     EVOVLE   341
          IF(AREA.LT.1..AND.AREA.GT.O..AND.CLEY(NCLE).LT.Y+1..AND.CLEY(NCLE) EVOVLE   342
         1.GT.Y.AND.Y+1..LE.BIGY) GO TO 19                             EVOVLE   343
```

```
C   BOX TURNS OUT TO BE SHARED BY A DIAPHRAGM
      DLINE=XLE(K)+.5*(XTE(K)-XLE(K))
      IF(AREA.LT.1.AND.AREA.GT.O..AND.((X.LE.DLINE.AND.X.GE.XMS(K)
     1.AND.ISS(K).LT.O).OR.(X.GT.DLINE.AND.X.LE.XTEML(K).AND.
     2IABS(ISS(K)).EQ.1))) GO TO 19
C   BOX TURNS OUT TO BE SHARED, BUT ISS(K) MAY NOT SO INDICATE
      IF(AREA.LT.1..AND.AREA.GT.O..AND.Y+1..LE.BOT.AND.((CLEY(J  ).LT.
     1Y+1..AND.CLEY(J  ).GT.Y+.5.AND.X.LE.DLINE.AND.X.GE.XMS(K).AND.
     2ISS(K+1).LT.O).OR.(CTEY(JJ  ).LT.Y+1..AND.CTEY(JJ  ).GT.Y+.5.AND.
     3X.GT.DLINE.AND.X.LE.XTEML(K).AND.IABS(ISS(K+1)).EQ.1))) GO TO 19
      GO TO 3000

   19 ID=ID+1
      IF (ID.GT.250) GO TO 28
      AD(ID)=1.-AREA
      XD(ID)=X
      YD(ID)=Y
      IND(IW)=O
      GO TO 3000
 1000 ID=ID+1
      IF (ID.GT.250) GO TO 28
      AD(ID)=1.
      XD(ID)=X
      YD(ID)=Y
      GO TO 3000
 2000 IW=IW+1
      IF (IW.GT.350) GOTO 22
      AW(IW)=1.
      XW(IW)=X
      YW(IW)=Y
      IND(IW)=1
      BXW(K)=X
      GO TO 3000

C SEE IF MAXIMUM Y OF INTEREST HAS BEEN EXCEEDED

 3000 IF(Y+1..LE.BOT) GO TO 3001

C IF MAXIMUM X OF INTEREST HAS BEEN EXCEEDED, STOP

      IF(X-.5.GE.ENDX) GO TO 4000

C   IF MAXIMUM Y OF INTEREST HAS BEEN EXCEEDED, GO TO NEXT X

      X=X+1.
      GO TO 16

C   IF MAXIMUM Y OF INTEREST HAS NOT BEEN EXCEEDED, GO TO NEXT Y

 3001 Y=Y+1.
      GO TO 17

C   GIVE SPECIAL WEIGHTING TO BOXES CUT BY SUPERSONIC TRAILING EDGE

 4000 N=IW+1
      SAT=.FALSE.
      DO 304 K=1,KEND
```

```
      IW=N-1                                                            EVOVLE   401
      IF(SAT) IW=N                                                      EVOVLE   402
      N=1                                                               EVOVLE   403
      DO 306 IJ=1,IW                                                    EVOVLE   404
      SAT=.TRUE.                                                        EVOVLE   405
      Z=K                                                               EVOVLE   406
      IF(XW(IJ).EQ.BXW(K)-1..AND.YW(IJ)+1..EQ.Z) IWWS=IJ                EVOVLE   407
      IF(XW(IJ).EQ.BXW(K)   .AND.YW(IJ)+1..EQ.Z) GO TO 309              EVOVLE   408
      GO TO 305                                                         EVOVLE   409
  309 IND(IJ)=-IND(IJ)                                                  EVOVLE   410
      IF(AW(IJ).LT..5) GO TO 316                                        EVOVLE   411
      GO TO 305                                                         EVOVLE   412
  316 AW(IWWS)=AW(IWWS)+AW(IJ)                                          EVOVLE   413
      IND(IWWS)=-IND(IWWS)                                              EVOVLE   414
      IF (IJ .NE. IW) GO TO 306                                         EVOVLE   415
      SAT    =   .FALSE.                                                EVOVLE   416
      GO TO 306                                                         EVOVLE   417
  305 XW(N)=XW(IJ)                                                      EVOVLE   418
      YW(N)=YW(IJ)                                                      EVOVLE   419
      AW(N)=AW(IJ)                                                      EVOVLE   420
      IND(N)=IND(IJ)                                                    EVOVLE   421
      N=N+1                                                             EVOVLE   422
      SAT=.FALSE.                                                       EVOVLE   423
  306 CONTINUE                                                          EVOVLE   424
  304 CONTINUE                                                          EVOVLE   425
                                                                        EVOVLE   426
      IW=N-1                                                            EVOVLE   427
      IF (IW.LE.350) GOTO 20                                            EVOVLE   428
   22 NWBT(KK) = NWBT(KK) - 10                                          EVOVLE   429
      GO TO 75                                                          EVOVLE   430
   20 IF (ID.LE.250) GOTO 85                                            EVOVLE   431
   28 IF (BXEL.NE.0.0) GOTO 21                                          EVOVLE   432
      BXEL =120.0 * ES                                                  EVOVLE   433
      GOTO 75                                                           EVOVLE   434
   21 BXEL = BXEL - 12.*ES                                              EVOVLE   435
      IF (BXEL /(ES*12.).GE.4.0) GOTO 75                                EVOVLE   436
      BXEL = 0.                                                         EVOVLE   437
      NWBT(KK) = NWBT(KK) - 10                                          EVOVLE   438
      GOTO 75                                                           EVOVLE   439
   85 CONTINUE                                                          EVOVLE   440
      BEX(KK) = BXEL                                                    EVOVLE   441
      WRITE (MTAP3) IW,ENDX,ES,EL,KEND,ID                               EVOVLE   442
      SW = 0.0                                                          EVOVLE   443
      WRITE (ITAPEW,114) KK                                             EVOVLE   444
      WRITE (ITAPEW,116)                                                EVOVLE   445
      LINE  =  10                                                       EVOVLE   446
      DO 4001 IJ=1,IW                                                   EVOVLE   447
      WRITE(MTAP3) XW(IJ),YW(IJ),AW(IJ),IND(IJ)                         EVOVLE   448
      LINE = LINE + 1                                                   EVOVLE   449
      IF ( LINE .GE. 56 )     LINE = 0                                  EVOVLE   450
      IF (LINE.NE.0) GO TO 30                                           EVOVLE   451
      LINE  =  11                                                       EVOVLE   452
      WRITE (ITAPEW,114) KK                                             EVOVLE   453
      WRITE (ITAPEW,116)                                                EVOVLE   454
   30 XWIN = XW(IJ)*XES + XIN                                           EVOVLE   455
      YWIN = YW(IJ)*XEL + 0.5*XEL                                       EVOVLE   456
      XAW  = AW(IJ)*XAR                                                 EVOVLE   457
```

```
      IXW  =  XW(IJ)                                                    EVOVLE   458
      IYW  =  YW(IJ)                                                    EVOVLE   459
      SW = SW + AW(IJ)                                                  EVOVLE   460
 4001 WRITE (ITAPEW,117) IJ,IND(IJ),IXW,IYW,AW(IJ),XWIN,YWIN,XAW        EVOVLE   461
      SD = 0.0                                                          EVOVLE   462
      IF(ID.EQ.0) GO TO 4006                                            EVOVLE   463
      WRITE (ITAPEW,115) KK                                             EVOVLE   464
      WRITE (ITAPEW,116)                                                EVOVLE   465
      LINE  =  10                                                       EVOVLE   466
      DO 4002 IJ=1,ID                                                   EVOVLE   467
      WRITE(MTAP3) XD(IJ),YD(IJ),AD(IJ)                                 EVOVLE   468
      LINE = LINE + 1                                                   EVOVLE   469
      IF ( LINE  GE. 56 )     LINE = 0                                  EVOVLE   470
      IF (LINE.NE.0) GO TO 60                                           EVOVLE   471
      LINE  =  11                                                       EVOVLE   472
      WRITE (ITAPEW,115) KK                                             EVOVLE   473
      WRITE (ITAPEW,116)                                                EVOVLE   474
   60 XWIN = XD(IJ)*XES + XIN                                           EVOVLE   475
      YWIN = YD(IJ)*XEL + 0.5*XEL                                       EVOVLE   476
      XAW  = AD(IJ)*XAR                                                 EVOVLE   477
      IAC  = 0                                                          EVOVLE   478
      SD = SD + AD(IJ)                                                  EVOVLE   479
      IXD  =  XD(IJ)                                                    EVOVLE   480
      IYD  =  YD(IJ)                                                    EVOVLE   481
 4002 WRITE (ITAPEW,117) IJ,IAC,IXD,IYD,AD(IJ),XWIN,YWIN,XAW            EVOVLE   482
                                                                        EVOVLE   483
 4006 NWB=IW                                                            EVOVLE   484
      NDB=ID                                                            EVOVLE   485
      NSW = NOXN(SW)                                                    EVOVLE   486
      NSD = NOXN(SD)                                                    EVOVLE   487
      WRITE (MTAP3) XTE                                                 EVOVLE   488
      WRITE (ITAPEW,102) NSW , NSD                                      EVOVLE   489
      BSR = ESR(KK)*12.0                                                EVOVLE   490
      BEL = BSR*EL                                                      EVOVLE   491
      WRITE (ITAPEW,103) BSR , BEL                                      EVOVLE   492
      XMM=0.0                                                           EVOVLE   493
      YMM=0.0                                                           EVOVLE   494
      DO 4031 IJ=1,IW                                                   EVOVLE   495
      XMM=AMAX1(XMM,XW(IJ))                                             EVOVLE   496
 4031 YMM=AMAX1(YMM,YW(IJ))                                             EVOVLE   497
      XMAX(KK)=XMM+1.0                                                  EVOVLE   498
      LS(KK)=YMM+1.0                                                    EVOVLE   499
      IF(NDB.EQ.0) GO TO 4033                                           EVOVLE   500
      DO 4032 IJ=1,ID                                                   EVOVLE   501
      XMM=AMAX1(XMM,XD(IJ))                                             EVOVLE   502
 4032 YMM=AMAX1(YMM,YD(IJ))                                             EVOVLE   503
 4033 CONTINUE                                                          EVOVLE   504
      XI(KK)=XMM                                                        EVOVLE   505
      YI(KK)=YMM                                                        EVOVLE   506
C                                                                       EVOVLE   507
C                                                                       EVOVLE   508
C FORMATS                                                               EVOVLE   509
C                                                                       EVOVLE   510
   98 FORMAT(10I5)                                                      EVOVLE   511
   99 FORMAT(8E10.2)                                                    EVOVLE   512
  102 FORMAT (1H1,//20X38HNUMBER OF BOXES IN TERMS OF UNIT AREAS, //    EVOVLE   513
     1        20X,I5,3X10HWING BOXES,//20X,I5,3X15HDIAPHRAGM BOXES,//)  EVOVLE   514
```

```
              103 FORMAT (/20X21HDIMENSIONS OF BOX ARE,//20X,F10.3,2X17HINCHES STREA EVOVLE     515
  515            1MWISE,//20X,F10.3,2X15HINCHES SPANWISE,//)                         EVOVLE     516
              114 FORMAT (1H1,19X,65HCOORDINATES AND AREAS OF WING BOXES ----------- EVOVLE     517
                 1-- SURFACE NUMBER ,I3//)                                           EVOVLE     518
              115 FORMAT (1H1,19X 70HCOORDINATES AND AREAS OF DIAPHRAGM BOXES ------ EVOVLE     519
                 1------- SURFACE NUMBER ,I3//)                                      EVOVLE     520
  520         116 FORMAT (22X,22HNORMALIZED COORDINATES,18X,16HREAL COORDINATES/     EVOVLE     521
                 1          4X,6HBOX NO,2X,5HINDEX,5X,1HX,7X,1HY,8X,4HAREA,7X,       EVOVLE     522
                 2              9HX(INCHES),4X,9HY(INCHES),3X,12HAREA(SQ.IN.)//)     EVOVLE     523
              117 FORMAT (5X,I5,2X,I5,2(3X,I5),4(3X,E10.3))                          EVOVLE     524
            C                                                                        EVOVLE     525
  525             RETURN                                                             EVOVLE     526
                  END                                                                EVOVLE     527
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  EVOVLE          1          525

VARIABLES      SN  TYPE             RELOCATION
 2231  ABX           REAL                              REFS        60        61   DEFINED        59
 1310  AD            REAL      ARRAY    TOMB           REFS         6        18       467       476       478       481
                                                    DEFINED       357       364
 2230  ANWB          REAL                              REFS        55   DEFINED        54
 2227  AREA          REAL                              REFS        55     2*319       320       324       330       334     2*341
                                                      2*345     2*349       357   DEFINED        53       318       319       320
  125  ASR           REAL      ARRAY    OLIVER         REFS         9        20        56   DEFINED        55
 3424  AW            REAL      ARRAY    TOMB           REFS         5        18       410     2*412       419       447       456
                                                        459       460   DEFINED       334       370       412       419
 3143  AY            REAL      ARRAY                   REFS        15        91       179     2*184   DEFINED        82        86
                                                         88        91
    0  BEL           REAL               BOXS           REFS        22       491   DEFINED       490
 2242  BEN           REAL                              REFS       208   DEFINED        93
    0  BETA          REAL                F.P.          REFS        56        57        65   DEFINED         1
    0  BEX           REAL      ARRAY    BXLL           REFS        21        32   DEFINED       440
 2266  BIGY          REAL                              REFS       218       341   DEFINED       202       217
 2246  BLEX          REAL                              REFS       126       233       257   DEFINED       123       126
 2267  BOT           REAL                              REFS       349       379   DEFINED       218
    1  BSR           REAL               BOXS           REFS        22       490       491   DEFINED       489
 3117  BXE           REAL      ARRAY                   REFS        15        92     2*177       180       186       188
                                                    DEFINED        80        92
 2216  BXEL          REAL                              REFS        72        80        93       168       208       431       434
                                                        435       440   DEFINED        32       432       434       436
 2741  BXW           REAL      ARRAY                   REFS        10       406       407   DEFINED       338       374
    0  CLEX          REAL      ARRAY    OLIVER         REFS         3        20       125     3*136       165     3*173     3*302
                                                    DEFINED        96
    0  CLEXR         REAL      ARRAY    IDIOT          REFS        11        19        40        41      2*46      2*76        81
                                                         96   DEFINED        36
   24  CLEY          REAL      ARRAY    OLIVER         REFS         3        20       103     2*133       134     3*136       139
                                                        165       170     3*173     2*279       283     2*299       301     2*302
                                                      2*341     2*349   DEFINED        97       1C4
  144  CLEYR         REAL      ARRAY    IDIOT          REFS        12        19      2*45        59        62      2*75        81
                                                         82        86        93        97   DEFINED        36
```

```
      SUBROUTINE HELZ (NF,NQ,NCS,ES,EL,KEND,KHELZ)                      HELZ   2
C                                                                       HELZ   3
      DIMENSION        XC(200) ,        X1(5) ,         X2(5)           HELZ   4
      DIMENSION          Y1(5) ,        Y2(5)                           HELZ   5
      DIMENSION  LC(40)                                                 HELZ   6
      DIMENSION ITAPES(50)                                              HELZ   7
      COMPLEX         XI(350) ,       XA(350)                           HELZ   8
      COMMON /TOMB/ XX(350) , YY(350) , NDB. LS(5) , XMAX(5) , NWB,     HELZ   9
     1             AD(250) , XD(250) , YD(250) , IND(350) , AW(350)     HELZ  10
      COMMON /COMA  / LC, BR                                            HELZ  11
      COMMON /CNTRL/ X1 , X2 , Y1 , Y2 , XC , NCF                       HELZ  12
      COMMON / CTAPES / ITAPES                                          HELZ  13
C                                                                       HELZ  14
C                                                                       HELZ  15
C INITIAL CONDITIONS                                                    HELZ  16
C                                                                       HELZ  17
      ITAPER = ITAPES(5)                                                HELZ  18
      ITAPEW = ITAPES (6)                                               HELZ  19
      MTAP8  =  ITAPES(28)                                              HELZ  20
      MTAP9  =  ITAPES(29)                                              HELZ  21
      MTAP14 =  ITAPES(34)                                              HELZ  22
      KLNN = LC(24)                                                     HELZ  23
      NCF = NCS                                                         HELZ  24
C                                                                       HELZ  25
      IF (KHELZ  EQ  2) GO TO 100                                       HELZ  26
      IF (NMPT NE O) WRITE (ITAPEW,1)                                   HELZ  27
      DO 20 II=1,NCS                                                    HELZ  28
      READ (ITAPER,30) X1(II) , Y1(II) , X2(II) , Y2(II)                HELZ  29
      IF (NMPT.EQ.O) GO TO 3                                            HELZ  30
      WRITE (ITAPEW,2) II , X1(II) , Y1(II) , X2(II) , Y2(II)           HELZ  31
    3 CONTINUE                                                          HELZ  32
      X1(II) = X1(II) / (ES*12.0) - 0.5                                 HELZ  33
      X2(II) = X2(II) / (ES*12.0) - 0.5                                 HELZ  34
      Y1(II) = Y1(II)/(ES*EL*12.0) - 0.5                                HELZ  35
   20 Y2(II) = Y2(II)/(ES*EL*12.0) - 0.5                                HELZ  36
      Y=0.                                                              HELZ  37
      DO 40 J=1,KEND                                                    HELZ  38
      K=Y+1.                                                            HELZ  39
      DO 25 I=1,NCS                                                     HELZ  40
      IF ( Y .GE. Y1(I) .AND. Y .LT. Y2(I) )      GO TO 26              HELZ  41
   25 CONTINUE                                                          HELZ  42
      I = NCS                                                           HELZ  43
   26 XC(K)  =  X1(I) + (X2(I)-X1(I))*(Y-Y1(I)) / (Y2(I)-Y1(I))         HELZ  44
   40 Y=Y+1.                                                            HELZ  45
      RETURN                                                            HELZ  46
  100 CONTINUE                                                          HELZ  47
      REWIND MTAP8                                                      HELZ  48
C                                                                       HELZ  49
      REWIND MTAP14                                                     HELZ  50
C                                                                       HELZ  51
      DO 60 I = 1,NQ                                                    HELZ  52
      KTEN = 0                                                          HELZ  53
      IF ( KLNN .EQ. 0 )      GO TO 4                                   HELZ  54
      WRITE (ITAPEW,70) NF                                              HELZ  55
      WRITE (ITAPEW,71) I                                               HELZ  56
      WRITE (ITAPEW,72)                                                 HELZ  57
      KTEN  =  10                                                       HELZ  58
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
    0  210                         71         69
    0  220                         74         72
  121  250                         54         51
    0  260                         53         52
    0  270                         57         56
  110  275                         50         37
  264  500      FMT                85         20
  317  504      FMT                90         48         58         79

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   14  100      JJ          22 80       217B                EXT REFS  NOT INNER
   23  110      II          25 29        7B        INSTACK
   42  130      II          32 36        7B        INSTACK
   65  160      I           42 43        3B        INSTACK
   76  170      I           46 47        3B        INSTACK
  115  260      I           52 53        3B        INSTACK
  126  270      I           56 57        3B        INSTACK
  155  190      I           65 66        3B        INSTACK
  163  200      I           67 78       40B                 NOT INNER
  167  210      J           69 71        4B        INSTACK
  176  220      J           72 74        5B        INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
      CTAPES        50               0 ITAPES (50)
      TOMB        2162               0 XW      (350)           350 YW      (350)           700 NDB     (1)
                                   701 LS      (5)             706 XMAX    (5)             711 NWB     (1)
                                   712 AD      (250)           962 XD      (250)          1212 YD      (250)
                                  1462 IND     (350)          1812 AW      (350)
      BOXS           2               0 BEL     (1)               1 BSR     (1)

STATISTICS
  PROGRAM LENGTH                  574B      380
  CM LABELED COMMON LENGTH       4246B     2214
          52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
                                             DEFINED      42        46        48        52        56        58        65
                                                  67      79
   333  II         INTEGER                      REFS      26        28        33        35   DEFINED        25        32
  2666  IND        INTEGER    ARRAY    TOMB     REFS       7
   344  IT         INTEGER                      REFS      73        75        76        77   DEFINED        68        70
                                                  73
     0  ITAPES     INTEGER    ARRAY    CTAPES   REFS       5         6        17
   326  ITAPEW     INTEGER                   DEFINED      17  I/O REFS       20        48        58        79
   512  IYD        INTEGER    ARRAY             REFS       4        50        54        55        61        62        73
                                             DEFINED      35
   430  IYW        INTEGER    ARRAY             REFS       4        40        44        45        61        62        70
                                             DEFINED      28
   345  J          INTEGER                      REFS      70        73   DEFINED        69        72
   330  JJ         INTEGER                      REFS      23   DEFINED        22
     0  KK         INTEGER             F.P      REFS      20   DEFINED         1
  1275  LS         INTEGER    ARRAY    TOMB     REFS       7
  1274  NDB        INTEGER             TOMB     REFS       7        20        30        32
   334  NDZ        INTEGER                      REFS      34        35        37        38        55        60        61
                                                  72 DEFINED        31        34
   327  NEX        INTEGER                      REFS      22   DEFINED        21
   342  NMIN       INTEGER                      REFS      63        67   DEFINED        62
   343  NMN        INTEGER                      REFS      64        65   DEFINED        63
   335  NOB        INTEGER                      REFS      41        42        51        52   DEFINED        40        50
   341  NTOT       INTEGER                      REFS      67        79   DEFINED        61
  1307  NWB        INTEGER             TOMB     REFS       7        20        25
   332  NWZ        INTEGER                      REFS      27        28        37        39        45        60        61
                                                  69 DEFINED        24        27
   337  N1         INTEGER                      REFS      46        56   DEFINED        44        54
   340  N2         INTEGER                      REFS      46        48        56        58   DEFINED        45        55
   346  PL         REAL       ARRAY             REFS       4        48        58        79   DEFINED        43        47
                                                  53      57        66        75        76        77
   236  SHAR       REAL                         REFS      77   DEFINED        14
   234  SURF       REAL                         REFS      47        75   DEFINED        12
  1702  XD         REAL       ARRAY    TOMB     REFS       7        33
     0  XEND       REAL                F.P.     REFS      21   DEFINED         1
  1302  XMAX       REAL       ARRAY    TOMB     REFS       7
     0  XW         REAL       ARRAY    TOMB     REFS       7        26
  2274  YD         REAL       ARRAY    TOMB     REFS       7        35
   536  YW         REAL       ARRAY    TOMB     REFS       7        28
        VARIABLES USED AS FILE NAMES, SEE ABOVE

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
        MAXO       INTEGER   0  INTRIN                61
        MINO       INTEGER   0  INTRIN                62

STATEMENT LABELS            DEF LINE    REFERENCES
   230  100                    80          22        39        49        59        60
    31  110                    29          25        26
    57  120                    39          30
    50  130                    36          32        33
   140  140                    60          38
    71  150                    44          41
     0  160                    43          42
     0  170                    47          46
   161  180                    67          64
     0  190                    66          65
     0  200                    78          67
```

```
      WRITE(ITAPEW,504) (PL(I),I=1,N2)                                 PLAN     59
      GO TO 100                                                         PLAN     60
  140 IF (NWZ.EQ.O.AND.NDZ.EQ.O) GO TO 100                              PLAN     61
      NTOT = MAXO (IYW(NWZ),IYD(NDZ))                                   PLAN     62
      NMIN = MINO (IYW(1),IYD(1))                                       PLAN     63
      NMN = NMIN - 1                                                    PLAN     64
      IF (NMN.EQ.O) GO TO 180                                           PLAN     65
      DO 190 I = 1,NMN                                                  PLAN     66
  190 PL(I) = BLANK                                                     PLAN     67
  180 DO 200 I = NMIN,NTOT                                              PLAN     68
      IT = O                                                            PLAN     69
      DO 210 J = 1,NWZ                                                  PLAN     70
      IF (IYW(J).EQ.I) IT = 1                                           PLAN     71
  210 CONTINUE                                                          PLAN     72
      DO 220 J = 1,NDZ                                                  PLAN     73
      IF (IYD(J).EQ.I) IT = IT + 2                                      PLAN     74
  220 CONTINUE                                                          PLAN     75
      IF (IT.EQ.1) PL(I) = SURF                                         PLAN     76
      IF (IT.EQ.2) PL(I) = DPGM                                         PLAN     77
      IF (IT.EQ.3) PL(I) = SHAR                                         PLAN     78
  200 CONTINUE                                                          PLAN     79
      WRITE (ITAPEW,504) (PL(I),I=1,NTOT)                               PLAN     80
  100 CONTINUE                                                          PLAN     81
C                                                                       PLAN     82
C                                                                       PLAN     83
C FORMATS                                                               PLAN     84
C                                                                       PLAN     85
  500 FORMAT (1H1,/30X51HGRAPHIC DISPLAY OF REGIONS ON SEMISPANS OF SURF PLAN     86
     1ACE ,I3/15X9HMACH NO. ,F7.3,10X10HBOX WIDTH,F7.3,2X6HINCHES,10X,   PLAN     87
     211HBOX LENGTH ,F7.3,2X6HINCHES,/30X,I5,2X13HSURFACE BOXES,15X,I5,  PLAN     88
     32X15HDIAPHRAGM BOXES,//30X12HW IS SURFACE,5X14HD IS DIAPHRAGM,    PLAN     89
     45X11HS IS SHARED,//)                                              PLAN     90
  504 FORMAT ((20X,20(1X,A1),20(1X,A1),10(1X,A1))/)                     PLAN     91
C                                                                       PLAN     92
      RETURN                                                            PLAN     93
      END                                                               PLAN     94
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  PLAN           1            92

VARIABLES     SN  TYPE          RELOCATION
 1310  AD         REAL       ARRAY    TOMB      REFS      7
  331  AK         REAL                          REFS     26       33   DEFINED     23
    0  AM         REAL                F.P.      REFS     20  DEFINED        1
 3424  AW         REAL       ARRAY    TOMB      REFS      7
    0  BEL        REAL                BOXS      REFS      9       20
  233  BLANK      REAL                          REFS     43       53       66   DEFINED     11
    1  BSR        REAL                BOXS      REFS      9       20
  235  DPGM       REAL                          REFS     57       76   DEFINED     13
  336  I          INTEGER                       REFS     43       47       48       53       57       58       66
                                                   70    73       75       76       77       79
```

```
      SUBROUTINE PLAN (KK,AM,XEND)
C
C
      DIMENSION         PL(50) ,       IYW(50) ,       IYD(50)
      DIMENSION ITAPES(50)
      COMMON / CTAPES / ITAPES
      COMMON /TOMB / XW(350) , YW(350) , NDB, LS(5) , XMAX(5) , NWB ,
     1               AD(250) , XD(250) , YD(250) , IND(350), AW(350)
      COMMON /BOXS/ BEL , BSR
C
      DATA   BLANK /4H    /
      DATA   SURF  /4HW   /
      DATA   DPGM  /4HD   /
      DATA   SHAR  /4HS   /
C
C
      ITAPEW = ITAPES(6)
C
C
      WRITE (ITAPEW,500)  KK , AM , BEL , BSR , NWB , NDB
      NEX = XEND + 5
      DO 100 JJ = 1,NEX
      AK = JJ
      NWZ = 0
      DO 110 II = 1,NWB
      IF (XW(II)+1.0.NE.AK) GO TO 110
      NWZ = NWZ + 1
      IYW(NWZ) = YW(II) + 1.0
  110 CONTINUE
      IF (NDB.EQ.0) GO TO 120
      NDZ = 0
      DO 130 II = 1,NDB
      IF (XD(II)+1.0.NE.AK) GO TO 130
      NDZ = NDZ + 1
      IYD(NDZ) = YD(II) + 1.0
  130 CONTINUE
      IF(NDZ.NE.0.AND.NWZ.EQ.0) GO TO 275
      IF (NDZ.NE.0) GO TO 140
  120 IF (NWZ.EQ.0) GO TO 100
      NOB = IYW(1) - 1
      IF (NOB.EQ.0) GO TO 150
      DO 160 I = 1,NOB
  160 PL(I) = BLANK
  150 N1 = IYW(1)
      N2 = IYW(NWZ)
      DO 170 I = N1,N2
  170 PL(I) = SURF
      WRITE (ITAPEW,504) (PL(I),I=1,N2)
      GO TO 100
  275 NOB=IYD(1)-1
      IF(NOB.EQ.0) GO TO 250
      DO 260 I=1,NOB
  260 PL(I)=BLANK
  250 N1=IYD(1)
      N2=IYD(NDZ)
      DO 270 I=N1,N2
  270 PL(I)=DPGM
```

```
 1              FUNCTION NOXN(XX)                                   NOXN     2
                NXX = XX                                            NOXN     3
                AXX = NXX                                           NOXN     4
                DIFX = XX - AXX                                     NOXN     5
 5              IF (DIFX.LE.0.5) NOXN = NXX                         NOXN     6
                IF (DIFX.GT.0.5) NOXN = NXX + 1                     NOXN     7
                RETURN                                              NOXN     8
                END                                                 NOXN     9


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    4  NOXN          1           7

VARIABLES     SN  TYPE           RELOCATION
   24  AXX        REAL                        REFS       4   DEFINED       3
   25  DIFX       REAL                        REFS       5         6   DEFINED       4
   22  NOXN       INTEGER                  DEFINED       5         6
   23  NXX        INTEGER                     REFS       3         5         6   DEFINED       2
    0  XX         REAL               F.P.     REFS       2         4   DEFINED       1

STATISTICS
  PROGRAM LENGTH                 26B      22
        52000B CM USED
```

```
 1          FUNCTION TANT(JJ)                                              TANT      2
            DIMENSION CLEX(20),CTEX(20),CLEY(20),CTEY(20)                  TANT      3
            COMMON/OLIVER/CLEX,CLEY,CTEX,CTEY                              TANT      4
            TANT=.25*(CTEX(JJ)-CTEX(JJ+1))/(CTEY(JJ+1)-CTEY(JJ))           TANT      5
 5          RETURN                                                         TANT      6
            END                                                            TANT      7
```

```
   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    4  TANT           1            5

VARIABLES      SN  TYPE           RELOCATION
    0  CLEX        REAL      ARRAY    OLIVER      REFS        2        3
   24  CLEY        REAL      ARRAY    OLIVER      REFS        2        3
   50  CTEX        REAL      ARRAY    OLIVER      REFS        2        3       2*4
   74  CTEY        REAL      ARRAY    OLIVER      REFS        2        3       2*4
    0  JJ          INTEGER            F.P.        REFS      4*4   DEFINED       1
   15  TANT        REAL                        DEFINED        4

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
   OLIVER         80            0 CLEX    (20)           20 CLEY   (20)            40 CTEX   (20)
                               60 CTEY    (20)

STATISTICS
  PROGRAM LENGTH                16B       14
  CM LABELED COMMON LENGTH     120B       80
          52000B CM USED
```

```
     1            FUNCTION TANL(J)                                          TANL        2
                  DIMENSION CLEX(20),CTEX(20),CLEY(20),CTEY(20)             TANL        3
                  COMMON/OLIVER/CLEX,CLEY,CTEX,CTEY                         TANL        4
                  TANL=.25*(CLEX(J)-CLEX(J+1))/(CLEY(J+1)-CLEY(J))          TANL        5
     5            RETURN                                                    TANL        6
                  END                                                       TANL        7
```

```
   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    4  TANL          1            5

VARIABLES     SN  TYPE         RELOCATION
    0  CLEX       REAL      ARRAY   OLIVER      REFS        2        3       2*4
   24  CLEY       REAL      ARRAY   OLIVER      REFS        2        3       2*4
   50  CTEX       REAL      ARRAY   OLIVER      REFS        2        3
   74  CTEY       REAL      ARRAY   OLIVER      REFS        2        3
    0  J          INTEGER            F.P.       REFS      4*4   DEFINED        1
   15  TANL       REAL                        DEFINED       4

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       OLIVER       80              0 CLEX    (20)            20 CLEY    (20)              40 CTEX    (20)
                                   60 CTEY    (20)

STATISTICS
  PROGRAM LENGTH                  16B       14
  CM LABELED COMMON LENGTH       120B       80
          52000B CM USED
```

```
STATEMENT LABELS               DEF LINE   REFERENCES
 1673  4033                      503        499

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   31            I         36 36        12B               EXT REFS
   47            I         37 37        12B               EXT REFS
   71  724       I         39 42         4B      INSTACK
  106  100       I         44 47        10B         OPT
  126  101       I         49 52        10B         OPT
  214  62        I         74 81        31B               EXT REFS
  260  63        I         84 89         7B      INSTACK
  300  65        I         90 92         4B      INSTACK
  325  1         I         95 97         6B      INSTACK
  345  2         I         99 101        6B      INSTACK
  364  3         I        110 112        5B      INSTACK
  376  4         I        117 119        5B      INSTACK
  407  6         I        124 126        5B      INSTACK
  420  8         J        132 140       24B
  447  10        JJ       146 154       24B
  507  13        J        164 167       11B         OPT
  557  26        I        183 185        7B      INSTACK    EXITS
  610  14        JJ       194 197        7B      INSTACK
  670  15        K        223 228       21B         OPT
  773  55        N        269 316      174B               EXT REFS
 1352  304       K        399 424       61B               NOT INNER
 1370  306       IJ       403 423       37B         OPT
 1474  4001      IJ       446 460       47B               EXT REFS
 1552  4002      IJ       466 481       44B               EXT REFS
 1644  4031      IJ       494 496        6B      INSTACK
 1664  4032      IJ       500 502        6B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50              0 ITAPES (50)
       TOMB       2162              0 XW      (350)         350 YW      (350)          700 NDB     (1)
                                  701 LS      (5)           706 XMAX    (5)            711 NWB     (1)
                                  712 AD      (250)         962 XD      (250)         1212 YD      (250)
                                 1462 IND     (350)        1812 AW      (350)
       IDIOT       411              0 CLEXR   (100)         100 CLEYR   (100)          200 CTEXR   (100)
                                  300 CTEYR   (100)         400 NCLER   (5)            405 NCTER   (5)
                                  410 NS      (1)
       OLIVER       90              0 CLEX    (20)           20 CLEY    (20)            40 CTEX    (20)
                                   60 CTEY    (20)           80 NWBT    (5)             85 ASR     (5)
       BXLL          5              0 BEX     (5)
       BOXS          2              0 BEL     (1)             1 BSR     (1)

STATISTICS
  PROGRAM LENGTH                3176B     1662
  CM LABELED COMMON LENGTH      5240B     2720
         52000B CM USED
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
    0  26                        185        183
  572  27                        188        184
 1445  28                        431        356        363
 1517  30                        454        450
  575  35                        189        187
 1001  40                        274        310
 1002  45                        275        273
 1116  46                        301        299
 1125  48                        304        300
 1132  49                        306        304
 1141  50                        310        305
    0  55                        316        269
 1573  60                        474        470
  314  61                         95         72
    0  62                         81         74
  266  63                         89         84         87
  263  64                         88         85
    0  65                         92         90
  270  66                         90         83
   76  75                         43        429        433        435        438
 1461  85                        439        430
 2072  98        FMT             510         33
 2074  99        FMT             511         36         37
    0  100                        47         44
    0  101                        52         49
 2076  102       FMT             512        488
 2112  103       FMT             514        491
 2125  114       FMT             516        443        452
 2136  115       FMT             518        463        472
 2150  116       FMT             520        444        453        464        473
 2167  117       FMT             523        460        481
  645  200                       211        209
  650  201                       217        208        210
    0  304                       424        399
 1417  305                       417        408        411
 1426  306                       423        403        414        416
 1407  309                       409        407
 1412  316                       412        410
 1045  600                       286        283
 1063  601                       290        285
 1073  602                       293        290
 1111  603                       297        292
 1047  604                       287        284
 1075  605                       294        291
   74  724                        42         39         40
  627  732                       202        200
  635  733                       208        201
 1313  1000                      362        252        324
 1323  2000                      368        257
 1334  3000                      379        262        331        353        361        367        375
 1344  3001                      392        379
 1347  4000                      397        383
    0  4001                      460        446
    0  4002                      481        466
 1616  4006                      483        462
    0  4031                      496        494
    0  4032                      502        500
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                   290      2*299       301     2*304       306       336      3*341     5*349
                                                   359        366       372       379       392    DEFINED       131       138
                                                   145        152       159       161       240       392
 2274  YD          REAL      ARRAY     TOMB        REFS         5        18       467       475       480       502
                                                 DEFINED      359       366
    0  YI          REAL      ARRAY      F.P.       REFS        13   DEFINED         1       505
 2327  YMM         REAL                            REFS       496       498       502       505    DEFINED       493       496
                                                   502
  536  YW          REAL      ARRAY     TOMB        REFS         4        18       406       407       418       447       455
                                                   458        496   DEFINED       336       372       418
 2314  YWIN        REAL                            REFS       460       481   DEFINED       455       475
 2307  Z           REAL                            REFS       406       407   DEFINED       405
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS       REFERENCES
       ATAN2       REAL       2 LIBRARY     77
       NOXN        INTEGER    1            485       486
       SIN         REAL       1 LIBRARY     80
       SQRT        REAL       1 LIBRARY     55        56
       TANL        REAL       1            243       279       287
       TANT        REAL       1            244       281       294

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       ABS         REAL       1  INTRIN              165       195
       AINT        REAL       1  INTRIN              103
       AMAX1       REAL       0  INTRIN              112       126       197       218       315       495       496       501
                                                     502
       AMIN1       REAL       0  INTRIN              119       167       315
       AMOD        REAL       2  INTRIN               61
       FLOAT       REAL       1  INTRIN               62
       IABS        INTEGER    1  INTRIN              324       345       349

STATEMENT LABELS               DEF LINE    REFERENCES
    0  1                           97          95
    0  2                          101          99
    0  3                          112         110
    0  4                          119         117
    0  6                          126         124
  425  7                          135       2*139
  441  8                          140         132       133       134       139
  454  9                          149       2*153
  470  10                         154         146       147       148       153
  475  11                         161         199       204       213
  477  12                         162         160
    0  13                         167         164
    0  14                         197         194
    0  15                         228         223
  721  16                         240         388
  730  17                         246         393
 1222  18                         332         330
 1301  19                         355         341       345       349
 1442  20                         430         427
 1451  21                         434         431
 1437  22                         428         333       369
  600  23                         193         168       175       178       182
  543  24                         179         170
  556  25                         183         179
```

```
VARIABLES       SN  TYPE          RELOCATION
 2211   SETT        LOGICAL                        REFS      24      291  DEFINED     268     296
 2223   SLE         REAL                           REFS      47       53  DEFINED      43      47
 3073   SN          REAL       ARRAY               REFS      14       81     2*85    2*88  DEFINED      79
 2300   SSCALE      REAL                           REFS     302      313      315 DEFINED     275     301
 2226   STE         REAL                           REFS      52       53  DEFINED      48      52
 2245   STEX        REAL                           REFS     119      233      257 DEFINED     116     119
 2311   SW          REAL                           REFS     459      485  DEFINED     442     459
 2304   T           REAL                           REFS     313      314  DEFINED     312
 2273   TANLJ       REAL                           REFS     288      313  DEFINED     243     287
 2274   TANTJJ      REAL                           REFS     295      314  DEFINED     244     294
 3023   THET        REAL       ARRAY               REFS      14     2*78       80 DEFINED      77      78
 2301   TSCALE      REAL                           REFS     307      314  DEFINED     276     306
 2272   X           REAL                           REFS   2*252    2*257    4*262   2*315   4*324     335     338
                                                  4*345   4*349      358      365     371     374     383     387
                                                DEFINED     239      387
 2727   XAL         REAL       ARRAY               REFS       8      315  DEFINED     313
 2236   XAR         REAL                           REFS     456      476  DEFINED      69
 2722   XAT         REAL       ARRAY               REFS       8      315  DEFINED     314
 2225   XAVE        REAL                           REFS      47       52  DEFINED      46      51
 2315   XAW         REAL                           REFS     460      481  DEFINED     456     476
 1702   XD          REAL       ARRAY    TOMB       REFS       5       18      467     474     479     501
                                                DEFINED     358      365
 2234   XEL         REAL                           REFS      69    2*455    2*475 DEFINED      67
 2233   XES         REAL                           REFS      67       69      454     474 DEFINED      66
    0   XI          REAL       ARRAY    F.P.       REFS      13  DEFINED        1     504
 2235   XIN         REAL                           REFS     454      474  DEFINED      68
 2330   XLE         REAL       ARRAY               REFS       6      180      186     188     224     225     226
                                                    227     262      277      279     288     324   2*344
                                                DEFINED     136      248
 2302   XLREF       REAL                           REFS     313  DEFINED      277     279     288     302
 1302   XMAX        REAL       ARRAY    TOMB       REFS       9       18  DEFINED     497
 2255   XMK         REAL                           REFS     167  DEFINED      165
 2326   XMM         REAL                           REFS     495      497      501     504 DEFINED     492     495
                                                    501
 2474   XMS         REAL       ARRAY               REFS       7      166      175     176     181     189     199
                                                    209     224      225      226     227     252     262     324
                                                    345     349  DEFINED      163     167     177     181     189
 2256   XMSK        REAL                           REFS     167  DEFINED      166
 2261   XQE         REAL                           REFS     175      176      177 DEFINED     173
 2222   XREF        REAL                           REFS      40       46       51 DEFINED      38      41
 2412   XTE         REAL       ARRAY               REFS       6      224      225     226     227     262     278
                                                    281     295      324      344     487 DEFINED     150     247
 2264   XTEMK       REAL                           REFS     197  DEFINED      195
 2556   XTEML       REAL       ARRAY               REFS       7      196      199     209     224     225     226
                                                    227     252      262      324     345     349
                                                DEFINED     193      197
 2265   XTEMLK      REAL                           REFS     197  DEFINED      196
 2303   XTREF       REAL                           REFS     314  DEFINED      278     281     295     307
    0   XW          REAL       ARRAY    TOMB       REFS       4       18      406     407     417     447     454
                                                    457     495  DEFINED      335     371     417
 2313   XWIN        REAL                           REFS     460      481  DEFINED     454     474
 2244   XX          REAL                           REFS     112      119      126 DEFINED     111     118     125
 2263   X22         REAL                           REFS   2*181    2*189  DEFINED     180     186     188
 2247   Y           REAL                           REFS     134      135      136     138     139     148     149
                                                    150     152      153      161     162     165     170     173
                                                    179   2*184      195      199     200     202     208     217
                                                    246     247      248      252     257   2*279   2*281     283
```

```
VARIABLES     SN  TYPE            RELOCATION
 2310  IWWS       INTEGER                          REFS     2*412    2*413  DEFINED      406
 2322  IXD        INTEGER                          REFS       481  DEFINED      479
 2316  IXW        INTEGER                          REFS       460  DEFINED      457
 2323  IYD        INTEGER                          REFS       481  DEFINED      480
 2317  IYW        INTEGER                          REFS       460  DEFINED      458
 2250  J          INTEGER                          REFS     2*133      134    6*136      139    2*165    4*279    2*283
                                                    286       287    2*349  DEFINED      132      164      241      286
 2253  JJ         INTEGER                          REFS     2*147      148    6*150      153    2*195    4*281    2*290
                                                    293       294    2*349  DEFINED      146      194      242      293
 2251  K          INTEGER                          REFS       136      150      163      166      167      175      176
                                                    177       180    2*181      186      188    2*189      193      196
                                                    197     2*199    2*209      211    5*224    5*225    5*226    5*227
                                                    247       248    3*252    4*262      277      278      279      281
                                                    288       295    7*324      338    3*344    4*345    4*349      374
                                                    405       406      407  DEFINED      135      149      162      223
                                                    246       399
 2257  KAA        INTEGER                          REFS     4*173  DEFINED      171
 2260  KAB        INTEGER                          REFS     2*173  DEFINED      172
    0  KEND       INTEGER              F.P.        REFS       223      399      441  DEFINED        1      222
    0  KK         INTEGER              F.P.        REFS        32     3*33       34       35     2*36     2*37       40
                                                     41      2*45     2*46     2*50     2*51       54       55     2*56
                                                     58      2*59     2*62     2*63       64       70       71     2*75
                                                   2*76      2*81       82       86       93       96       97      100
                                                    101     2*428    2*437      440      443      452      463      472
                                                    489       497      498      504      505  DEFINED        1
 2312  LINE       INTEGER                          REFS       448      449      450      468      469      470
                                                DEFINED       445      448      449      451      465      468      469
                                                    471
 1275  LS         INTEGER     ARRAY    TOMB        REFS        13       18  DEFINED      498
 2215  MTAP3      INTEGER                       DEFINED        29 I/O REFS      441      447      467      487
 2275  N          INTEGER                          REFS       270      400      401      417      418      419        4
                                                    421       426  DEFINED      269      397      402      421
 2232  NBX        INTEGER                          REFS        61       62  DEFINED       60       61
 2217  NCLE       INTEGER                          REFS        36       39       44       59       62       73       93
                                                     95       103      104      124      130      164      170      171
                                                    172     2*177    2*299      301    5*302    2*341
                                                DEFINED        34       58       70
  620  NCLER      INTEGER     ARRAY    IDIOT       REFS        10       19       34       58       70
                                                DEFINED        33
 2237  NCLES      INTEGER                          REFS        74       83       84       90      132      179      183
                                                    186       279      283  DEFINED       73      130
 2220  NCTE       INTEGER                          REFS        37       49       99      105      110      117      144
                                                    194     2*304      306    5*307  DEFINED       35       71
  625  NCTER      INTEGER     ARRAY    IDIOT       REFS        11       19       35       71  DEFINED       33
 2252  NCTES      INTEGER                          REFS       146      281      290  DEFINED      144
 1274  NDB        INTEGER              TOMB        REFS        18      499  DEFINED      484
  632  NS         INTEGER              IDIOT       REFS        19
 2325  NSD        INTEGER                          REFS       488  DEFINED      486
 2324  NSW        INTEGER                          REFS       488  DEFINED      485
 1307  NWB        INTEGER              TOMB        REFS        18  DEFINED      483
  120  NWBT       INTEGER     ARRAY    OLIVER      REFS         9       20       54      428      437
                                                DEFINED        33      428      437
 2207  OVRLAP     INTEGER                          REFS        23      257  DEFINED      232      233
 2276  S          REAL                             REFS       283      290  DEFINED      271
 2212  SAT        LOGICAL                          REFS        24      401  DEFINED      398      404      415      422
 2320  SD         REAL                             REFS       478      486  DEFINED      461      478
 2210  SET        LOGICAL                          REFS        24      284  DEFINED      267      289
```

```
VARIABLES      SN  TYPE            RELOCATION
  3047  CT        REAL     ARRAY              REFS        14      2*88  DEFINED       81
    50  CTEX      REAL     ARRAY    OLIVER    REFS         3        20      111      118     3*150      195     3*307
                                           DEFINED       100
   310  CTEXR     REAL     ARRAY    IDIOT     REFS        12        19     2*51      100   DEFINED       37
    74  CTEY      REAL     ARRAY    OLIVER    REFS         4        20    2*147      148     3*150      153       195
                                              2*281      290     2*304      306    2*307     2*349
                                           DEFINED       101       105
   454  CTEYR     REAL     ARRAY    IDIOT     REFS        12        19     2*50      101   DEFINED       37
  2224  DELY      REAL                        REFS        47        52  DEFINED       45        50
  2305  DLINE     REAL                        REFS     2*345     2*349  DEFINED      344
  2241  DX        REAL                        REFS        77        79  DEFINED       76
  2240  DY        REAL                        REFS        77        79  DEFINED       75
     0  EL        REAL              F.P.      REFS        59        63       67       91        93       97       101
                                                441      490   DEFINED        1       57        65
     0  ENDX      REAL              F.P.      REFS       112       116      163      248       383      411
                                           DEFINED         1       109      112
  2243  ENDY      REAL                        REFS       104       105      199      200       218      222       247
                                                248      252       257  DEFINED      103
     0  ES        REAL              F.P.      REFS        66        68       91       92        93       96        97
                                                100      101       432      434      435       441
                                           DEFINED         1        64
     0  ESR       REAL     ARRAY    F.P.      REFS        11        59       63       64       489
                                           DEFINED         1        56       62       63
  2734  F         REAL     ARRAY              REFS         8       316    5*318  DEFINED       315      316
  2221  I         INTEGER                     REFS      2*36      2*37       40       41      2*45     2*46      2*50
                                               2*51     2*75      2*76       77     3*78        79     2*80      4*81
                                               2*85     2*86      5*88     2*91     2*92      2*96     2*97     2*100
                                              2*101      111       118      125    2*184       188      271       312
                                                313      314     3*315    2*316  DEFINED        36       37        39
                                                 44       49        74       84       90        95       99       110
                                                117      124       183      270
  2321  IAC       INTEGER                     REFS       481   DEFINED      477
  2262  IBNX      INTEGER                     REFS       177   DEFINED      176
  2271  ID        INTEGER                     REFS       355       356      357      358       359      362       363
                                                364      365       366      430      441       462      466       484
                                                500  DEFINED       238      355      362
  2306  IJ        INTEGER                     REFS     3*406     2*407    2*409      410       412      414       417
                                                418      419       420    4*447      454       455      456       457
                                                458      459     3*460    3*467      474       475      476       478
                                                479      480     2*481      495      496       501      502
                                           DEFINED       403       446      466      494       500
     0  IM        INTEGER  *UNUSED  F.P.   DEFINED         1
  2666  IND       INTEGER  ARRAY    TOMB      REFS        10        18      409      413       420      447       460
                                           DEFINED       337       360      373      409       413      420
  2277  INT       INTEGER                     REFS       287       288      294      295       310
                                           DEFINED       272       274
  2254  IRS       INTEGER                     REFS       202       217  DEFINED      158       203      212
  2640  ISS       INTEGER  ARRAY              REFS         7       252    3*324    2*345     2*349
                                           DEFINED       211       224      225      226       227
  2213  ITAPER    INTEGER                  DEFINED        27  I/O REFS       33       36        37
     0  ITAPES    INTEGER  ARRAY    CTAPES    REFS        16        17       27       28        29
  2214  ITAPEW    INTEGER                  DEFINED        28  I/O REFS      443      444       452      453       460
                                                463      464       472      473      481       488      491
  2270  IW        INTEGER                     REFS       332       333      334      335       336      337       360
                                                368      369       370      371      372       373      397       403
                                                414      427       441      446      483       494
                                           DEFINED       237       332      368      400       401      426
```

```
    4 CONTINUE
      CALL CNRW (-MTAP14,XA,NWB)
      CALL CNRW (-MTAP8,XI,NWB)
      DO 50 JJ = 1,NWB
      XW = XX(JJ)
      YW = YY(JJ)
      K=YW+1.
      DO 27 II=1,NCS
      IF (YW.GE.Y1(II).AND.YW.LT.Y2(II)) GO TO 28
   27 CONTINUE
      II = NCS
   28 IF ((XW.LT.XC(K)).OR.(YW.LT.Y1(II)).OR.(YW.GT.Y2(II))) GO TO 50
C
      M1 = 1
      M2 = NQ
      XI(JJ) = XA(JJ)
C
   50 CONTINUE
      CALL CNRW (MTAP9,XI,NWB)
      IF ( KLNN .EQ. 0 )      GO TO 60
      DO 55 IA = 1,NWB
      KTEN = KTEN + 1
      IF (KTEN .LT. 56) GO TO 81
      KTEN  =  11
      WRITE (ITAPEW,70) NF
      WRITE (ITAPEW,71) I
      WRITE (ITAPEW,72)
   81 XES = 12.0*ES
      XEL = XES*EL
      YEW = YY(IA)
      XWIN = (XX(IA) + 0.5) * XES
      YWIN = (YEW + 0.5) * XEL
      IXW  =  XX(IA)
      IYW  =  YEW
   55 WRITE (ITAPEW,73) IA , IXW , IYW , XI(IA) , XWIN , YWIN
   60 CONTINUE
      REWIND MTAP8
      REWIND MTAP14
      WRITE (MTAP9)  XC
      END FILE MTAP9
C
C
C FORMATS
C
    1 FORMAT (1H1,/20X35HCOORDINATES OF HINGE LINE IN INCHES,//13X
     1        7HSURFACE,26X7HINBOARD,27X8HOUTBOARD,//14X5HINDEX,
     2        22X1HX,14X1HY,19X1HX,14X1HY, //)
    2 FORMAT ((15X,I3,2(10X,E10.2,5X,E10.2))/)
   10 FORMAT (I5)
   30 FORMAT(4E10.2)
   70 FORMAT (1H1,20X15HSURFACE NUMBER ,I3,//3X67HINTERPOLATED MODAL DAT
     1A FOR SURFACE AND CONTROL SURFACE COMBINATION, //)
   71 FORMAT (20X8HMODE NO ,I3 //)
   72 FORMAT (9X,22HNORMALIZED COORDINATES,8X,17HMODAL DEFLECTIONS,
     1       19X,16HREAL COORDINATES/
     2        5X,6HBOX NO,4X,1HX,7X,1HY,12X,1HH,15X,5HALPHA,11X,
     3           9HX(INCHES),9X,9HY(INCHES)//)
```

```
  115          73 FORMAT (5X,I5,2(3X,I5),4(3X,E15.6))                              HELZ      116
          C                                                                         HELZ      117
                RETURN                                                              HELZ      118
                END                                                                 HELZ      119


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
   3  HELZ             1          45       117

VARIABLES       SN  TYPE              RELOCATION
 1310  AD           REAL         ARRAY   TOMB       REFS       8
 3424  AW           REAL         ARRAY   TOMB       REFS       8
   50  BR           REAL                 COMA       REFS      10
    0  EL           REAL                 F.P.       REFS      34       35       86   DEFINED       1
    0  ES           REAL                 F.P.       REFS      32       33       34       35       85
                                                 DEFINED       1
  466  I            INTEGER                         REFS    2*40     6*43       55       83  DEFINED       39       42
                                                      51
  475  IA           INTEGER                         REFS      87       88       90     2*92  DEFINED       78
  462  II           INTEGER                         REFS    4*28     5*30     2*32     2*33     2*34     2*35     2*66
                                                    2*69  DEFINED       27       65       68
 2666  IND          INTEGER      ARRAY   TOMB       REFS       8
  453  ITAPER       INTEGER                      DEFINED      17  I/O REFS      28
    0  ITAPES       INTEGER      ARRAY   CTAPES     REFS       6       12       17       18       19       20       21
  454  ITAPEW       INTEGER                      DEFINED      18  I/O REFS      26       30       54       55       56
                                                      82      83       84       92
  503  IXW          INTEGER                         REFS      92  DEFINED       90
  504  IYW          INTEGER                         REFS      92  DEFINED       91
  464  J          * INTEGER                      DEFINED      37
  470  JJ           INTEGER                         REFS      62       63     2*73  DEFINED       61
  465  K            INTEGER                         REFS      43       69  DEFINED       38       64
    0  KEND         INTEGER              F.P.       REFS      37  DEFINED        1
    0  KHELZ        INTEGER              F.P.       REFS      25  DEFINED        1
  460  KLNN         INTEGER                         REFS      53       77  DEFINED       22
  467  KTEN         INTEGER                         REFS      79       80  DEFINED       52       57       79       81
    0  LC           INTEGER      ARRAY   COMA       REFS       5       10       22
 1275  LS           INTEGER      ARRAY   TOMB       REFS       8
  457  MTAP14       INTEGER                         REFS      59  DEFINED       21  I/O REFS      49       95
  455  MTAP8        INTEGER                         REFS      60  DEFINED       19  I/O REFS      47       94
  456  MTAP9        INTEGER                         REFS      76  DEFINED       20  I/O REFS      96       97
  473  M1         * INTEGER                      DEFINED      71
  474  M2         * INTEGER                      DEFINED      72
  334  NCF          INTEGER              CNTRL      REFS      11  DEFINED       23
    0  NCS          INTEGER              F.P.       REFS      23       27       39       42       65       68
                                                 DEFINED       1
 1274  NDB          INTEGER              TOMB       REFS       8
    0  NF           INTEGER              F.P.       REFS      54       82  DEFINED        1
  461  NMPT         INTEGER     *UNDEF              REFS      26       29
    0  NQ           INTEGER              F.P.       REFS      51       72  DEFINED        1
 1307  NWB          INTEGER              TOMB       REFS       8       59       60       61       76       78
 2001  XA           COMPLEX      ARRAY              REFS       7       59       73
   24  XC           REAL         ARRAY   CNTRL      REFS       3       11       69       96  DEFINED       43
```

```
VARIABLES      SN  TYPE             RELOCATION
  1702  XD          REAL       ARRAY     TOMB         REFS         8
   477  XEL         REAL                              REFS        89   DEFINED       86
   476  XES         REAL                              REFS        86        88  DEFINED        85
   505  XI          COMPLEX    ARRAY                  REFS         7        60       76        92   DEFINED       73
  1302  XMAX        REAL       ARRAY     TOMB         REFS         8
   471  XW          REAL                              REFS        69   DEFINED       62
   501  XWIN        REAL                              REFS        92   DEFINED       88
     0  XX          REAL       ARRAY     TOMB         REFS         8        62       88        90
     0  X1          REAL       ARRAY     CNTRL        REFS         3        11       30        32      2*43
                                                    DEFINED       28        32
     5  X2          REAL       ARRAY     CNTRL        REFS         3        11       30        33        43
                                                    DEFINED       28        33
   463  Y           REAL                              REFS        38      2*40       43        44   DEFINED       36       44
  2274  YD          REAL       ARRAY     TOMB         REFS         8
   500  YEW         REAL                              REFS        89        91  DEFINED        87
   472  YW          REAL                              REFS        64      2*66     2*69   DEFINED        63
   502  YWIN        REAL                              REFS        92   DEFINED       89
   536  YY          REAL       ARRAY     TOMB         REFS         8        63       87
    12  Y1          REAL       ARRAY     CNTRL        REFS         4        11       30        34        40     2*43       66
                                                        69   DEFINED        28       34
    17  Y2          REAL       ARRAY     CNTRL        REFS         4        11       30        35        40       43       66
                                                        69   DEFINED        28       35
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
        CNRW                3               59          60         76

STATEMENT LABELS              DEF LINE   REFERENCES
   360  1       FMT              102         26
   376  2       FMT              105         30
    47  3                         31         29
   133  4                         58         53
   402  10      FMT  NO REFS     106
     0  20                        35         27
     0  25                        41         39
   101  26                        43         40
     0  27                        67         65
   160  28                        69         66
   404  30      FMT              107         28
     0  40                        44         37
   174  50                        75         61          69
     0  55                        92         78
   236  60                        93         51          77
   406  70      FMT              108         54          82
   422  71      FMT              110         55          83
   425  72      FMT              111         56          84
   444  73      FMT              115         92
   214  81                        85         80
   115  100                       46         25

LOOPS   LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   26   20        II          27 35        35B                   EXT REFS
   65   40        J           37 44        27B                   NOT INNER
   71   25        I           39 41         7B        INSTACK      EXITS
  122   60        I           51 93       117B                   EXT REFS  NOT INNER
  142   50        JJ          61 75        35B                   NOT INNER
  150   27        II          65 67         7B        INSTACK      EXITS
```

```
LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
  202  55        IA           78 92        34B               EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       TOMB        2162                0 XX      (350)          350 YY     (350)          700 NDB     (1)
                                     701 LS      (5)            706 XMAX   (5)            711 NWB     (1)
                                     712 AD      (250)          962 XD     (250)         1212 YD      (250)
                                    1462 IND     (350)         1812 AW     (350)
       COMA          41                0 LC      (40)            40 BR     (1)
       CNTRL        221                0 X1      (5)              5 X2     (5)             10 Y1      (5)
                                      15 Y2      (5)             20 XC     (200)          220 NCF     (1)
       CTAPES        50                0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                  3312B     1738
  CM LABELED COMMON LENGTH        4652B     2474
         52000B CM USED
```

```
      SUBROUTINE MODAZ (NF,NMODES,ITAPE,WILK,QZ,NPOINT,ENDX,ES,EL,KEND) MODAZ        2
C                                                                       MODAZ        3
      DIMENSION      NGP(20) ,   XTERM1(20) ,   XTERM2(20)              MODAZ        4
      DIMENSION    XGP(12,20) ,  YTERM1(20) ,   YTERM2(20)              MODAZ        5
      DIMENSION    YGP(12,20) ,     A(350) ,       LL(50)               MODAZ        6
      DIMENSION      QY(220) ,     ZEL(20) ,       YY(50)               MODAZ        7
      DIMENSION ITAPES(50)                                              MODAZ        8
      DIMENSION    DEF(12,20) ,     XAT(50) ,   DEFL(50,2)              MODAZ        9
      DIMENSION     AN(50,2) ,     YX(350) ,      XX(350)               MODAZ       10
      DIMENSION       LC(40) ,     NAME(2)                              MODAZ       11
C                                                                       MODAZ       12
      COMPLEX        DWSH(350)                                          MODAZ       13
C                                                                       MODAZ       14
      COMMON /MODD/ XJUNK(8040), NC                                     MODAZ       15
      COMMON /COMA  / LC, BR                                            MODAZ       16
      COMMON /TOMB / XW(350) , YW(350) , NDB, LS(5) , XMAX(5) , NWB ,   MODAZ       17
     1               AD(250) , XD(250) , YD(250) , IND(350), AW(350)    MODAZ       18
      COMMON/JUNK/XTERM1,XTERM2,YTERM1,YTERM2,DIST                      MODAZ       19
      COMMON /CNTRL/ X1(5) , X2(5) , Y1(5) , Y2(5) , XC(200) , NCF      MODAZ       20
      COMMON /CHSP/ KDEG                                                MODAZ       21
      COMMON / CTAPES / ITAPES                                          MODAZ       22
C                                                                       MODAZ       23
      LOGICAL WILK                                                      MODAZ       24
C                                                                       MODAZ       25
C                                                                       MODAZ       26
      ITAPER = ITAPES(5)                                                MODAZ       27
      ITAPEW = ITAPES(6)                                                MODAZ       28
      MTAP2  =  ITAPES(22)                                              MODAZ       29
      MTAP49 =  ITAPES(49)                                              MODAZ       30
      MTAP9 = ITAPES(29)                                                MODAZ       31
C                                                                       MODAZ       32
C                                                                       MODAZ       33
      NMPT = LC(23)                                                     MODAZ       34
      KLNN  = LC(24)                                                    MODAZ       35
      NN=KEND+3                                                         MODAZ       36
                                                                        MODAZ       37
      K=1                                                               MODAZ       38
      IF ( WILK )             GO TO 11                                  MODAZ       39
      NCF      =  1                                                     MODAZ       40
      Y1(1)    =  100.0                                                 MODAZ       41
      Y2(1)    =  100.0                                                 MODAZ       42
   11 CONTINUE                                                          MODAZ       43
      DO 1999  JJ=1,NWB                                                 MODAZ       44
C     ESTABLISH CHORDWISE LIMITS OF BOXES                               MODAZ       45
      IF (YW(JJ)+1.0.GT.KEND) KEND = KEND + 1                           MODAZ       46
 1999 CONTINUE                                                          MODAZ       47
                                                                        MODAZ       48
      NENDX=ENDX                                                        MODAZ       49
      NGPTOT=0                                                          MODAZ       50
      READ (ITAPER,83) NLINES, NELAXS, NICH, NISP                       MODAZ       51
C                                                                       MODAZ       52
      DO 1082 I=1,NLINES                                                MODAZ       53
      READ (ITAPER,62) NGP(I),XTERM1(I),YTERM1(I),XTERM2(I),YTERM2(I)   MODAZ       54
      NGPTOT=NGPTOT + NGP(I)                                            MODAZ       55
      NGPI=NGP(I)                                                       MODAZ       56
      XTERM1(I) = XTERM1(I) - 6.0*ES                                    MODAZ       57
      XTERM2(I) = XTERM2(I) - 6.0*ES                                    MODAZ       58
```

```
      DEL=(XTERM2(I)-XTERM1(I))/(YTERM2(I)-YTERM1(I))                   MODAZ      59
      YTM1 = YTERM1(I)                                                  MODAZ      60
      XTM1 = XTERM1(I)                                                  MODAZ      61
      READ (ITAPER,63)(YGP(J,I),J=1,NGPI)                               MODAZ      62
      YTM2 = YTERM2(I)                                                  MODAZ      63
      XTM2 = XTERM2(I)                                                  MODAZ      64
      DO 1083 JK =1,NGPI                                                MODAZ      65
      XGP(JK,I) = (YGP(JK,I) - YTM1)*DEL + XTM1                         MODAZ      66
      XGP1 = YGP(JK,I)                                                  MODAZ      67
      IF (XGP1.EQ.YTM2) XGP(JK,I) = XTM2                                MODAZ      68
      XGP(JK,I) = XGP(JK,I)/12.0                                        MODAZ      69
      YGP(JK,I) = YGP(JK,I)/12.0                                        MODAZ      70
 1083 CONTINUE                                                          MODAZ      71
 1082 CONTINUE                                                          MODAZ      72
      KEL=0                                                             MODAZ      73
      IF (NELAXS.EQ.1) CALL FORM (NLINES,KEL,NGPTOT,NGPI,XGP,YGP,NGP)   MODAZ      74
      NLIN=NLINES-1                                                     MODAZ      75
      NGPO=NGPTOT                                                       MODAZ      76
      DO 77 K=1,NLIN                                                    MODAZ      77
      NGPL=NGP(K)                                                       MODAZ      78
      IF(XGP(NGPL,K).EQ.XGP(1,K+1).AND.YGP(NGPL,K).EQ.YGP(1,K+1))       MODAZ      79
     1 NGPO=NGPO-1                                                      MODAZ      80
   77 CONTINUE                                                          MODAZ      81
      REWIND MTAP2                                                      MODAZ      82
      IF ( NMPT .EQ. 0 )       GO TO 2                                  MODAZ      83
      IF ( .NOT. WILK )  WRITE (ITAPEW,400) NF                          MODAZ      84
      IF ( WILK )        WRITE (ITAPEW,601)                             MODAZ      85
      WRITE (ITAPEW,70)  NGPTOT, NLINES, NMODES                         MODAZ      86
      LINE   =  13 + NGP(1)                                             MODAZ      87
      IF ( WILK ) LINE = LINE + 14                                      MODAZ      88
    2 CONTINUE                                                          MODAZ      89
      DO 1 I=1,NLINES                                                   MODAZ      90
      YTERM1(I)=YTERM1(I)/(ES*EL*12.)-.5                                MODAZ      91
      CALL ORDS (YTERM1(I))                                             MODAZ      92
      YTERM2(I)=YTERM2(I)/(ES*EL*12.)-.5                                MODAZ      93
      CALL ORDS (YTERM2(I))                                             MODAZ      94
      NGPI=NGP(I)                                                       MODAZ      95
      XTERM1(I)=XTERM1(I)/(ES*12.)                                      MODAZ      96
      XTERM2(I)=XTERM2(I)/(ES*12.)                                      MODAZ      97
      ZEL(I) = (XTERM2(I) - XTERM1(I)) / (YTERM2(I) - YTERM1(I))        MODAZ      98
      IF (NMPT.EQ.0) GO TO 4                                            MODAZ      99
      IF ( I .EQ. 1 )    GO TO 40                                       MODAZ     100
      LINE  =  LINE + 9 + NGP(I)                                        MODAZ     101
      IF ( LINE .LT. 55 )     GO TO 40                                  MODAZ     102
      WRITE (ITAPEW,400) NF                                             MODAZ     103
      IF ( WILK )   WRITE (ITAPEW,601)                                  MODAZ     104
      LINE      =  9 + NGP(I)                                           MODAZ     105
   40 CONX  =  12.0 * ES                                                MODAZ     106
      CONY  =  CONX * EL                                                MODAZ     107
      XT1   =  CONX * (XTERM1(I) + 0.5)                                 MODAZ     108
      YT1   =  CONY * (YTERM1(I) + 0.5)                                 MODAZ     109
      XT2   =  CONX * (XTERM2(I) + 0.5)                                 MODAZ     110
      YT2   =  CONY * (YTERM2(I) + 0.5)                                 MODAZ     111
      WRITE (ITAPEW,198) I , XT1 , YT1 , XT2 , YT2                      MODAZ     112
      WRITE (ITAPEW,602)  NGP(I)                                        MODAZ     113
                                                                        MODAZ     114
    4 DO 10 J = 1,NGPI                                                  MODAZ     115
```

```
      XGP(J,I)=XGP(J,I)/ES                                            MODAZ    116
      YGP(J,I) = YGP(J,I) / (ES*EL) - 0.5                             MODAZ    117
      CALL ORDS (YGP(J,I))                                            MODAZ    118
      IF (NMPT.EQ.0) GO TO 10                                         MODAZ    119
      XT  =  CONX * (XGP(J,I) + 0.5)                                  MODAZ    120
      YT  =  CONY * (YGP(J,I) + 0.5)                                  MODAZ    121
      WRITE (ITAPEW,718) J , XT , YT                                  MODAZ    122
   10 CONTINUE                                                        MODAZ    123
                                                                      MODAZ    124
                                                                      MODAZ    125
    1 CONTINUE                                                        MODAZ    126
                                                                      MODAZ    127
C  INTERPOLATE AND EXTRAPOLATE TO GET INTERMEDIATE DISPLACEMENTS ON GIVE MODAZ  128
      KDEG   =  NISP                                                  MODAZ    129
      REWIND MTAP49                                                   MODAZ    130
      DO 150 M=1,NMODES                                               MODAZ    131
      CALL RNRW (-MTAP49,QY,NC)                                       MODAZ    132
      LINE = 0                                                        MODAZ    133
      IF (NMPT.EQ.0) GO TO 862                                        MODAZ    134
      WRITE (ITAPEW,400) NF                                           MODAZ    135
      WRITE (ITAPEW,450) M                                            MODAZ    136
  862 JB = NPOINT                                                     MODAZ    137
      IF (NELAXS.NE.0) GO TO 12                                       MODAZ    138
      DO 15 K = 1,NLINES                                              MODAZ    139
      JB = JB + 1                                                     MODAZ    140
      NGPI = NGP(K)                                                   MODAZ    141
      IF (K.EQ.1) GO TO 16                                            MODAZ    142
      NGPX = NGP(K-1)                                                 MODAZ    143
      IF (XGP(1,K).EQ.XGP(NGPX,K-1).AND.YGP(1,K).EQ.YGP(NGPX,K-1))    MODAZ    144
     1  JB = JB - 1                                                   MODAZ    145
   16 DEF (1,K) = QY(JB)                                              MODAZ    146
      DO 15 L = 2,NGPI                                                MODAZ    147
      JB = JB + 1                                                     MODAZ    148
      DEF (L,K) = QY(JB)                                              MODAZ    149
   15 CONTINUE                                                        MODAZ    150
      GO TO 24                                                        MODAZ    151
   12 NZLIN = NLINES / 2                                              MODAZ    152
      DO 17 K = 1,NZLIN                                               MODAZ    153
      JB = JB + 1                                                     MODAZ    154
      NGPI = NGP(K)                                                   MODAZ    155
      IF (K.EQ.1) GO TO 19                                            MODAZ    156
      NGPX = NGP(K-1)                                                 MODAZ    157
      IF (XGP(1,K).EQ.XGP(NGPX,K-1).AND.YGP(1,K).EQ.YGP(NGPX,K-1))    MODAZ    158
     1   JB = JB - 2                                                  MODAZ    159
   19 DEF (1,K) = QY(JB)                                              MODAZ    160
      JB = JB + 1                                                     MODAZ    161
      DEF (1,K+NZLIN) = DEF (1,K) + QY(JB) * DIST                     MODAZ    162
      DO 17 L = 2,NGPI                                                MODAZ    163
      JB = JB + 1                                                     MODAZ    164
      DEF (L,K) = QY(JB)                                              MODAZ    165
      JB = JB + 1                                                     MODAZ    166
      DEF (L,K+NZLIN) = DEF(L,K) + QY(JB) * DIST                      MODAZ    167
   17 CONTINUE                                                        MODAZ    168
   24 IF  (M.NE.NMODES) JB = JB - NGPO                                MODAZ    169
      NPOINT = JB                                                     MODAZ    170
      IF (NMPT.EQ.0) GO TO 20                                         MODAZ    171
      DO 60 J = 1,NLINES                                              MODAZ    172
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      NGPI = NGP(J)                                                      MODAZ  173
      DO 60 K = 1,NGPI                                                   MODAZ  174
      LINE = LINE + 1                                                    MODAZ  175
      IF (LINE.GT.50) LINE = 0                                           MODAZ  176
      IF (LINE.NE.0) GO TO 60                                            MODAZ  177
      WRITE (ITAPEW,400) NF                                              MODAZ  178
      WRITE (ITAPEW,450) M                                               MODAZ  179
   60 WRITE (ITAPEW,82) J , K , DEF(K,J)                                 MODAZ  180
   20 NPT = 0                                                            MODAZ  181
      DO 875 KL=1,NLINES                                                 MODAZ  182
      NGPI=NGP(KL)                                                       MODAZ  183
      DO 22 I = 1,NGPI                                                   MODAZ  184
      XAT(I) = YGP(I,KL)                                                 MODAZ  185
   22 DEFL(I,1) = DEF(I,KL)                                              MODAZ  186
      NGPL = MINO (4,NGPI)                                               MODAZ  187
      NFP = 0                                                            MODAZ  188
C                                                                        MODAZ  189
            R      =   -1.0                                              MODAZ  190
      DO 876   MM  =   1,KEND                                            MODAZ  191
         R      =    R  +  1.0                                           MODAZ  192
      IF ( R .GT. YTERM2(KL) .OR. R .LT. YTERM1(KL) )       GO TO 876    MODAZ  193
      IF  ( .NOT. WILK )      GO TO 31                                   MODAZ  194
      DO 30 II = 1,NCF                                                   MODAZ  195
      IF (R.GE.Y1(II).AND.R.LT.Y2(II).OR.R.EQ.Y2(NCF)) GO TO 31          MODAZ  196
   30 CONTINUE                                                           MODAZ  197
      GO TO 876                                                          MODAZ  198
   31 NFP     =  NFP  +  1                                               MODAZ  199
      YY(NFP) = R                                                        MODAZ  200
  876 CONTINUE                                                           MODAZ  201
      IF ( NFP .EQ. 0 )  GO TO 875                                       MODAZ  202
      CALL HELGA (YY,AN,NFP,50,XAT,DEFL,NGPI,NGPL,50,0,0)                MODAZ  203
      DO 6 LM = 1,NFP                                                    MODAZ  204
      NPT = NPT + 1                                                      MODAZ  205
      IF (M.GT.1) GO TO 7                                                MODAZ  206
      YX(NPT) = YY(LM)                                                   MODAZ  207
       R      =     YX (NPT)                                             MODAZ  208
      XX(NPT) = XTERM1(KL) + (R-YTERM1(KL))*ZEL(KL)                      MODAZ  209
    7 A(NPT) = AN(LM,1)                                                  MODAZ  210
      IF (ABS(A(NPT)) .LE. 1.0E-07)  A(NPT)  =  0.0                      MODAZ  211
    6 CONTINUE                                                           MODAZ  212
  875 CONTINUE                                                           MODAZ  213
      LPT     =     NPT                                                  MODAZ  214
      CALL RNRW (MTAP2,A,LPT)                                            MODAZ  215
  150 CONTINUE                                                           MODAZ  216
      REWIND MTAP49                                                      MODAZ  217
      REWIND MTAP2                                                       MODAZ  218
      KDEG    =  NICH                                                    MODAZ  219
      DO 570 M=1,NMODES                                                  MODAZ  220
      CALL RNRW (-MTAP2,A,LPT)                                           MODAZ  221
      DO 34 II = 1,NWB                                                   MODAZ  222
   34 DWSH(II)    =  CMPLX (0.0,0.0)                                     MODAZ  223
C                                                                        MODAZ  224
      DO 120 I = 1,KEND                                                  MODAZ  225
      R  =  I  -  1                                                      MODAZ  226
      IF ( .NOT. WILK )       GO TO 36                                   MODAZ  227
      DO 32 II = 1,NCF                                                   MODAZ  228
      IF (R.GE.Y1(II).AND.R.LT.Y2(II).OR.R.EQ.Y2(NCF))  GO TO 36         MODAZ  229
```

```
   32 CONTINUE
      GO TO 120
C        COLLECT   LINE   DATA
   36 NPT      =  0
      DO 5 J = 1,LPT
      IF (YX(J) .NE. R) GO TO 5
      NPT = NPT + 1
      XAT(NPT) = XX(J)
      DEFL (NPT,1)  =  A (J)
    5 CONTINUE
      NGPI = NPT
      NPL = MINO (4,NPT)
      NFB = O
      DO 8 J = 1,NWB
      KK  =  YW(J) + 1.0
      IF (YW(J) .NE  R) GO TO 8
       IF  (.NOT.WILK)   GO TO 35
      IF (XW(J).LT.XC(KK))  GO TO 8
   35 NFB = NFB + 1
      LL(NFB) = J
      YY(NFB) = XW(J)
    8 CONTINUE
      IF (NFB.EQ.O)  GO TO 120
      CALL HELGA (YY,AN,NFB,50,XAT,DEFL,NPT,NPL,50,0,1)
      DO 9 J = 1,NFB
      LLL = LL(J)
      IF (ABS(AN(J,1)) .LE. 1.0E-05) AN(J,1) = 0.0
      IF (ABS(AN(J,2)) .LE. 1.0E-07) AN(J,2) = 0.0
      AN(J,2)  =  AN(J,2) / ES
    9 DWSH(LLL) =  CMPLX (AN(J,1),AN(J,2))
  120 CONTINUE
  570 CALL CNRW (ITAPE,DWSH,NWB)
      WRITE (ITAPE)  YY
      END FILE ITAPE
      IF (ITAPE .NE. MTAP9) GO TO 1100
      IF ( KLNN .EQ. O )      GO TO 1100
      CALL GEDLAB(8HMODAZ 01,ITAPE,NAME,NF,IRD,JCD)
      DO 1080 J = 1,NMODES
      MAX=2*NWB
      CALL GETROW(ITAPE,1,DWSH,MAX)
      WRITE (ITAPEW,666) J
      IF (.NOT.WILK) WRITE (ITAPEW,667) NF
      IF (WILK) WRITE (ITAPEW,668) NF
      WRITE (ITAPEW,669)
      KTEN  =  10
      DO 1090 II = 1,NWB
      KTEN  =  KTEN + 1
      IF ( KTEN .LT. 56 )     GO TO 600
      KTEN  =  11
      WRITE (ITAPEW,666) J
      IF (.NOT.WILK) WRITE (ITAPEW,667) NF
      IF (WILK) WRITE (ITAPEW,668) NF
      WRITE (ITAPEW,669)
  600 XES = 12.0*ES
      XEL = XES*EL
      YEW = YW(II)
      XWIN = (XW(II) + 0.5) * XES
```

```
      YWIN = (YEW + 0.5) * XEL
      IXW  =  XW(II)
      IYW  =  YW(II)
 1090 WRITE (ITAPEW,670) II , IXW , IYW , DWSH(II) , XWIN , YWIN
 1080 CONTINUE
C
C
C FORMATS
C

   62 FORMAT(I5,4E10.2)
   63 FORMAT(8E10.2)
   70 FORMAT (2X19HMODAL DATA GIVEN AT,I4,1X9HPOINTS ON,I3,1X9HLINES FOR
     1        ,I3,1X5HMODES)
   71 FORMAT(4E17.6,2I5)
   82 FORMAT (15X,I4,10X,I4,10X,E18.7)
   83 FORMAT(4I5)
  198 FORMAT (//3X,24HTERMINAL POINTS ON LINE ,I5,2X,13HIN INCHES ARE/
     1          6X,4HX(1),9X,4HY(1),9X,4HX(2),9X,4HY(2)/
     2          4(2X,E12.5)/)
  400 FORMAT (1H1,19X15HSURFACE NUMBER ,I3,/)
  450 FORMAT (15X26HINPUT MODAL DATA FOR MODE ,I3 //
     1        15X4HLINE,10X5HPOINT,15X10HDEFLECTION, //)
  601 FORMAT (15X,21HCONTROL SURFACE MODES/)
  602 FORMAT ( 3X,23HNO. OF POINTS ON LINE =,I5/
     1         3X,37HCOORDINATES OF POINTS (IN INCHES) ARE/
     2         3X,5HINDEX,9X,1HX,15X,1HY/)
  666 FORMAT (1H1,9X30HINTERPOLATED DATA FOR MODE NO ,I3 //)
  667 FORMAT (10X15HPRIMARY SURFACE,15X11HSURFACE NO ,I3 //)
  668 FORMAT (10X16HCONTROL SURFACES,15X11HSURFACE NO ,I3 //)
  669 FORMAT (9X,22HNORMALIZED COORDINATES,8X,17HMODAL DEFLECTIONS,
     1        19X,16HREAL COORDINATES/
     2        5X,6HBOX NO,4X,1HX,7X,1HY,12X,1HH,15X,5HALPHA,11X,
     3           9HX(INCHES),9X,9HY(INCHES)//)
  670 FORMAT (5X,I5,2(3X,I5),4(3X,E15.6))
  718 FORMAT (4X,I3,3X,E14.7,3X,E14.7)
  778 FORMAT (1H1)


 1100 RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
   3 MODAZ             1          325

VARIABLES      SN  TYPE              RELOCATION
 2632  A           REAL         ARRAY                    REFS         5    210    214    220    237
                                                      DEFINED       209    210
 1310  AD          REAL         ARRAY      TOMB          REFS        16
 4722  AN          REAL         ARRAY                    REFS         9    202    209    252    255    256    257
                                                        2*258   DEFINED    255    256    257
```

VARIABLES		SN	TYPE		RELOCATION								
3424	AW		REAL	ARRAY	TOMB	REFS	16						
50	BR		REAL		COMA	REFS	15						
1602	CONX		REAL			REFS	106	107	109	119	DEFINED	105	
1603	CONY		REAL			REFS	108	110	120	DEFINED	106		
4114	DEF		REAL	ARRAY		REFS	8	161	166	179	185		
						DEFINED	145	148	159	161	164	166	
4556	DEFL		REAL	ARRAY		REFS	8	202	252	DEFINED	185	237	
1565	DEL		REAL			REFS	65	DEFINED	58				
120	DIST		REAL		JUNK	REFS	18	161	166				
6364	DWSH		COMPLEX	ARRAY		REFS	12	260	268	289	DEFINED	222	258
0	EL		REAL		F.P.	REFS	90	92	106	116	283		
						DEFINED	1						
0	ENDX		REAL		F.P.	REFS	48	DEFINED	1				
0	ES		REAL		F.P.	REFS	56	57	90	92	95	96	105
						115	116	257	282	DEFINED	1		
1563	I		INTEGER			REFS	5*53	54	55	2*56	2*57	4*58	59
						60	61	62	63	2*65	66	67	2*68
						2*69	2*90	91	2*92	93	94	2*95	2*96
						5*97	99	100	104	107	108	109	110
						111	112	2*115	2*116	117	119	120	2*184
						2*185	225	DEFINED	52	89	183	224	
1624	II		INTEGER			REFS	2*195	222	2*228	284	285	287	288
						2*289	DEFINED	194	221	227	274		
2666	IND		INTEGER	ARRAY	TOMB	REFS	16						
1633	IRD	*	INTEGER			REFS	265						
0	ITAPE		INTEGER		F.P.	REFS	260	263	265	268	DEFINED	1	
						I/O REFS	261	262					
1543	ITAPER		INTEGER			DEFINED	26	I/O REFS	50	53	61		
0	ITAPES		INTEGER	ARRAY	CTAPES	REFS	7	21	26	27	28	29	30
1544	ITAPEW		INTEGER			DEFINED	27	I/O REFS	83	84	85	102	103
						111	112	121	134	135	177	178	179
						269	270	271	272	278	279	280	281
						289							
1644	IXW		INTEGER			REFS	289	DEFINED	287				
1645	IYW		INTEGER			REFS	289	DEFINED	288				
1570	J		INTEGER			REFS	61	2*115	2*116	117	119	120	121
						172	2*179	234	236	237	243	244	246
						248	249	254	2*255	2*256	2*257	2*258	269
						278	DEFINED	61	114	171	233	242	253
						266							
1613	JB		INTEGER			REFS	139	143	145	147	148	153	157
						159	160	161	163	164	165	166	168
						169	DEFINED	136	139	143	147	153	157
						160	163	165	168				
1634	JCD	*	INTEGER			REFS	265						
1554	JJ		INTEGER			REFS	45	DEFINED	43				
1573	JK		INTEGER			REFS	2*65	66	67	2*68	2*69		
						DEFINED	64						
1553	K		INTEGER			REFS	77	4*78	140	141	142	4*143	145
						148	154	155	156	4*157	159	2*161	164
						2*166	2*179	DEFINED	37	76	138	152	173
0	KDEG		INTEGER		CHSP	REFS	20	DEFINED	128	218			
1575	KEL		INTEGER			REFS	73	DEFINED	72				
0	KEND		INTEGER		F.P.	REFS	35	2*45	190	224	DEFINED	1	45
1631	KK		INTEGER			REFS	246	DEFINED	243				
1620	KL		INTEGER			REFS	182	184	185	2*192	3*208		
						DEFINED	181						

```
VARIABLES      SN  TYPE          RELOCATION
  1551  KLNN       INTEGER                        REFS      264   DEFINED      34
  1636  KTEN       INTEGER                        REFS      275       276   DEFINED     273       275       277
  1615  L          INTEGER                        REFS      148       164     2*166   DEFINED     146       162
     0  LC         INTEGER     ARRAY    COMA      REFS       10        15        33        34
  1601  LINE       INTEGER                        REFS       87       100       101       174       175       176
                                               DEFINED       86        87       100       104       132       174       175
  3370  LL         INTEGER     ARRAY              REFS        5       254   DEFINED       248
  1632  LLL        INTEGER                        REFS      258   DEFINED       254
  1625  LM         INTEGER                        REFS      206       209   DEFINED       203
  1626  LPT        INTEGER                        REFS      214       220       233   DEFINED       213
  1275  LS         INTEGER     ARRAY    TOMB      REFS       16
  1612  M          INTEGER                        REFS      135       168       178       205   DEFINED       130       219
  1635  MAX        INTEGER                        REFS      268   DEFINED       267
  1623  MM       * INTEGER                     DEFINED      190
  1545  MTAP2      INTEGER                        REFS      214       220   DEFINED        28  I/O REFS        81       217
  1546  MTAP49     INTEGER                        REFS      131   DEFINED        29  I/O REFS       129       216
  1547  MTAP9      INTEGER                        REFS      263   DEFINED        30
  6362  NAME       INTEGER     ARRAY              REFS       10       265
 17550  NC         INTEGER              MODD      REFS       14       131
   334  NCF        INTEGER              CNTRL     REFS       19       194       195       227       228
                                               DEFINED       39
  1274  NDB        INTEGER              TOMB      REFS       16
  1560  NELAXS     INTEGER                        REFS       73       137   DEFINED        50
  1555  NENDX    * INTEGER                     DEFINED       48
     0  NF         INTEGER              F.P.      REFS       83       102       134       177       265       270       271
                                                    279       280   DEFINED         1
  1630  NFB        INTEGER                        REFS      247       248       249       251       252       253
                                               DEFINED      241       247
  1621  NFP        INTEGER                        REFS      198       199       201       202       203
                                               DEFINED      187       198
  1646  NGP        INTEGER     ARRAY              REFS        3        54        55        73        77        86        94
                                                    100       104       112       140       142       154       156       172
                                                    182   DEFINED        53
  1564  NGPI       INTEGER                        REFS       61        64        73       114       146       162       173
                                                    183       186       202   DEFINED        55        94       140       154
                                                    172       182       239
  1600  NGPL       INTEGER                        REFS     2*78       202   DEFINED        77       186
  1577  NGPO       INTEGER                        REFS       78       168   DEFINED        75        78
  1556  NGPTOT     INTEGER                        REFS       54        73        75        85   DEFINED        49        54
  1614  NGPX       INTEGER                        REFS    2*143     2*157   DEFINED       142       156
  1561  NICH       INTEGER                        REFS      218   DEFINED        50
  1562  NISP       INTEGER                        REFS      128   DEFINED        50
  1576  NLIN       INTEGER                        REFS       76   DEFINED        74
  1557  NLINES     INTEGER                        REFS       52        73        74        85        89       138       151
                                                    171       181   DEFINED        50
     0  NMODES     INTEGER              F.P.      REFS       85       130       168       219       266
                                               DEFINED        1
  1550  NMPT       INTEGER                        REFS       82        98       118       133       170
                                               DEFINED       33
  1552  NN       * INTEGER                     DEFINED       35
  1627  NPL        INTEGER                        REFS      252   DEFINED       240
     0  NPOINT     INTEGER              F.P.      REFS      136   DEFINED         1       169
  1617  NPT        INTEGER                        REFS      204       206       207       208       209     2*210       213
                                                    235       236       237       239       240       252
                                               DEFINED      180       204       232       235
  1307  NWB        INTEGER              TOMB      REFS       16        43       221       242       260       267       274
  1616  NZLIN      INTEGER                        REFS      152       161       166   DEFINED       151
```

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VARIABLES      SN  TYPE         RELOCATION
  3452  QY         REAL      ARRAY                REFS        6      131      145      148      159      161      164
                                                   166
     0  QZ         REAL     *UNUSED     F.P.    DEFINED       1
  1622  R          REAL                           REFS      191    2*192    3*195      199      208    3*228      234
                                                   244  DEFINED      189      191      207      225
     0  WILK       LOGICAL              F.P.      REFS       23       38       83       84       87      103      193
                                                   226      245      270      271      279      280
                                                DEFINED       1
  4474  XAT        REAL      ARRAY                REFS        8      202      252  DEFINED      184      236
    24  XC         REAL      ARRAY      CNTRL     REFS       19      246
  1702  XD         REAL      ARRAY      TOMB      REFS       16
  1640  XEL        REAL                           REFS      286  DEFINED      283
  1637  XES        REAL                           REFS      283      285  DEFINED      282
  1672  XGP        REAL      ARRAY                REFS        4       68       73     2*78      115      119    2*143
                                                 2*157  DEFINED       65       67       68      115
  1574  XGP1       REAL                           REFS       67  DEFINED       66
     0  XJUNK      REAL      ARRAY      MODD      REFS       14
  1302  XMAX       REAL      ARRAY      TOMB      REFS       16
  1610  XT         REAL                           REFS      121  DEFINED      119
     0  XTERM1     REAL      ARRAY      JUNK      REFS        3       18       56       58       60       95       97
                                                   107      208  DEFINED       53       56       95
    24  XTERM2     REAL      ARRAY      JUNK      REFS        3       18       57       58       63       96       97
                                                   109  DEFINED       53       57       96
  1567  XTM1       REAL                           REFS       65  DEFINED       60
  1572  XTM2       REAL                           REFS       67  DEFINED       63
  1604  XT1        REAL                           REFS      111  DEFINED      107
  1606  XT2        REAL                           REFS      111  DEFINED      109
     0  XW         REAL      ARRAY      TOMB      REFS       16      246      243      285      287
  1642  XWIN       REAL                           REFS      289  DEFINED      285
  5624  XX         REAL      ARRAY                REFS        9      236  DEFINED      208
     0  X1         REAL      ARRAY      CNTRL     REFS       19
     5  X2         REAL      ARRAY      CNTRL     REFS       19
  2274  YD         REAL      ARRAY      TOMB      REFS       16
  1641  YEW        REAL                           REFS      286  DEFINED      284
  2252  YGP        REAL      ARRAY                REFS        5       65       66       69       73     2*78      116
                                                   117      120    2*143    2*157      184  DEFINED       61       69
                                                   116
  1611  YT         REAL                           REFS      121  DEFINED      120
    50  YTERM1     REAL      ARRAY      JUNK      REFS        4       18       58       59       90       91       97
                                                   108      192      208  DEFINED       53       90
    74  YTERM2     REAL      ARRAY      JUNK      REFS        4       18       58       62       92       93       97
                                                   110      192  DEFINED       53       92
  1566  YTM1       REAL                           REFS       65  DEFINED       59
  1571  YTM2       REAL                           REFS       67  DEFINED       62
  1605  YT1        REAL                           REFS      111  DEFINED      108
  1607  YT2        REAL                           REFS      111  DEFINED      110
   536  YW         REAL      ARRAY      TOMB      REFS       16       45      243      244      284      288
  1643  YWIN       REAL                           REFS      289  DEFINED      286
  5066  YX         REAL      ARRAY                REFS        9      207      234  DEFINED      206
  4032  YY         REAL      ARRAY                REFS        6      202      206      252      261
                                                DEFINED     199      249
    12  Y1         REAL      ARRAY      CNTRL     REFS       19      195      228  DEFINED       40
    17  Y2         REAL      ARRAY      CNTRL     REFS       19    2*195    2*228  DEFINED       41
  4006  ZEL        REAL      ARRAY                REFS        6      208  DEFINED       97
        VARIABLES USED AS FILE NAMES, SEE ABOVE
```

```
EXTERNALS          TYPE    ARGS        REFERENCES
        CNRW                 3            260
        FORM                 7             73
        GEDLAB               6            265
        GETROW               4            268
        HELGA               11            202       252
        ORDS                 1             91        93       117
        RNRW                 3            131       214       220

INLINE FUNCTIONS   TYPE    ARGS          DEF LINE  REFERENCES
        ABS        REAL      1  INTRIN               210       255       256
        CMPLX      COMPLEX   2  INTRIN               222       258
        MINO       INTEGER   0  INTRIN               186       240

STATEMENT LABELS               DEF LINE   REFERENCES
     0   1                        125        89
   176   2                         88        82
   265   4                        114        98
   670   5                        238       233       234
     0   6                        211       203
   600   7                        209       205
   716   8                        250       242       244       246
     0   9                        258       253
   311   10                       122       114       118
    27   11                        42        38
   375   12                       151       137
     0   15                       149       138       146
   354   16                       145       141
     0   17                       167       152       162
   415   19                       159       155
   505   20                       180       170
     0   22                       185       183
   446   24                       168       150
     0   30                       196       194
   551   31                       198       193       195
     0   32                       229       227
     0   34                       222       221
   714   35                       247       245
   656   36                       232       226       228
   243   40                       105        99       101
   472   60                       179       171       173       176
  1360   62       FMT             296        53
  1363   63       FMT             297        61
  1365   70       FMT             298        85
  1375   71       FMT   NO REFS   300
     0   77                        80        76
  1400   82       FMT             301       179
  1404   83       FMT             302        50
   745   120                      259       224       230       251
     0   150                      215       130
  1406   198      FMT             303       111
  1421   400      FMT             306        83       102       134       177
  1425   450      FMT             307       135       178
     0   570                      260       219
  1026   600                      282       276
  1436   601      FMT             309        84       103
  1442   602      FMT             310        11
```

```
INLINE FUNCTIONS    TYPE     ARGS         DEF LINE  REFERENCES
       CMPLX       COMPLEX    2  INTRIN                18

STATEMENT LABELS                  DEF LINE   REFERENCES
 1011  1                            205        81       114
  517  2                            149       117       144
  141  3                             81        78
  751  4                            192       187
  324  5                            115        83
  323  6                            114       109
    0  12                           167       160
  522  13                           150       115
    0  15                           181       174       177
    0  35                           140       135
    0  42                           166       163
    0  50                            95        86        90
    0  60                           103        99
    0  66                           127       121       124
 1115  100       FMT                210       113       148       191       203
  146  200                           85       194
  761  300                          196       105
 1011  400                          204       195       199
 1122  500       FMT                211        79       112       147       190       202
  753  600                          193       157       158
   37  700                           33        19
  102  710                           58        32

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
  142  1         I           81 205      652B                EXT REFS  NOT INNER
  151  50        IO          86 95        57B                EXT REFS  NOT INNER
  172  50        JO          90 95        34B                EXT REFS
  246  60        IO1         99 103       25B                EXT REFS
  331  2         J          117 149      171B                EXT REFS  NOT INNER
  335  66        K1         121 127       40B                EXT REFS  NOT INNER
  347  66        K2         124 127       24B                EXT REFS
  420  35        JJ         135 140       44B                EXT REFS
  536  600       IL         157 193      220B                EXT REFS  NOT INNER
  544  12        IX         160 167       53B                EXT REFS  NOT INNER
  556  42        JX         163 166       37B                EXT REFS
  636  15        MX         174 181       54B                EXT REFS  NOT INNER
  651  15        KX         177 181       37B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50                0 ITAPES (50)
       CORPSE     4000                0 R1      (4000)

STATISTICS
  PROGRAM LENGTH              1441B     801
  CM LABELED COMMON LENGTH    7722B    4050
         52000B CM USED
```

```
VARIABLES     SN  TYPE            RELOCATION
 1345  MX         INTEGER                      REFS     175     176    4*178  DEFINED    174
    O  N          INTEGER              F.P.    REFS      81  DEFINED      1
 1323  NBOX       INTEGER                      REFS     108   2*113     143    2*148    185    3*186    2*191
                                                198   2*203  DEFINED    107      142    184      197
    O  NPIF       LOGICAL              F.P.    REFS      12      78     109      144    187      199
                                            DEFINED       1
 1340  NUP        INTEGER                      REFS     163     177  DEFINED      155    156
    O  P          REAL                 F.P.    REFS      19      73      75       89     93       98      123
                                                131     132     156     162      168    176
                                            DEFINED       1
 1302  Q          REAL                         REFS      73      89      98      123    131      132      162
                                                176  DEFINED      72
    O  R1         COMPLEX    ARRAY    CORPSE   REFS       5       8      11      113    148    2*186      191
                                              2*198     203  DEFINED    108      143    185      186      198
 1337  S          REAL                         REFS   3*164     175   2*178  DEFINED    154      192
    O  VBO        REAL                 F.P.    REFS      79     112     147      190    202
                                            DEFINED       1
 1364  WB1        REAL       ARRAY             REFS       3     164     178  DEFINED     26       27       28
                                                 29      30      31       46     47       48       49       50
                                                 51      52      53       54     55       56       57
 1412  WX1        REAL       ARRAY             REFS       4      66      68       70     93    2*126      138
                                                139     164  DEFINED      65     66       67       68       69
                                                 70
 1350  XB1        REAL       ARRAY             REFS       3   4*164   4*178  DEFINED     20       21       22
                                                 23      24      25       34     35       36       37       38
                                                 39      40      41       42     43       44       45
 1270  XJT      * COMPLEX   *UNDEF             REFS      10
 1254  XJ1        COMPLEX                      REFS       9     126     128      143  DEFINED    120      126
                                                128
 1262  XJ1J2      COMPLEX                      REFS      10     108     198  DEFINED    104
 1264  XJ1T       COMPLEX                      REFS      10      93      96      104    164      168      185
                                            DEFINED      85      93      96      159    164      168
 1276  XJ2        COMPLEX                      REFS      10     143  DEFINED      141
 1266  XJ2T       COMPLEX                      REFS      10     102     104      178    182      185
                                            DEFINED      97     102     169      178    182
 1256  XJ21       COMPLEX                      REFS       9     138     141  DEFINED    133      138
 1260  XJ22       COMPLEX                      REFS       9     139     141  DEFINED    134      139
 1312  XN         REAL                         REFS      87      88      98      102    122      129      130
                                                161     170     171  DEFINED     82
 1406  XN1        REAL       ARRAY             REFS       3     175     176    3*178  DEFINED    170      171
 1274  XTRA     * COMPLEX   *UNDEF             REFS      10
 1400  XX1        REAL       ARRAY             REFS       3      60      62       64     87       88      122
                                                125     136     137      161  DEFINED     59       60       61
                                                 62      63      64
 1332  X1         REAL                         REFS     131     137  DEFINED      129
 1333  X2         REAL                         REFS     132     136  DEFINED      130
 1325  YL         REAL                         REFS     125     136     137      154    192
                                            DEFINED     118     151
 1410  Z          REAL       ARRAY             REFS       4     178  DEFINED      172    173
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS       REFERENCES
       CEXP       COMPLEX    1 LIBRARY    93    102     126     138      139    164      178
       COS        REAL       1 LIBRARY    92     93     101     102      126    138      139      164      178
       NORDER     INTEGER    2           107    142     184     197
       SQRT       REAL       1 LIBRARY    71     93     102     125      136    137    3*164      175    2*178
```

```
VARIABLES      SN  TYPE           RELOCATION
 1327  A           REAL                          REFS       123      125   DEFINED      122
 1346  ARG         REAL                          REFS       178  DEFINED      175
 1316  AX          REAL                          REFS        92      101   DEFINED       91      100
 1335  A5          REAL                          REFS     2*138  DEFINED      136
 1336  A6          REAL                          REFS     2*139  DEFINED      137
 1331  B           REAL                          REFS     2*126  DEFINED      125
 1306  BANG        REAL                          REFS        77      182   DEFINED       76
 1301  BETA        REAL                          REFS        74       76       93   DEFINED       71
 1305  BIG         REAL                          REFS       128  DEFINED       75
 1307  BING        REAL                          REFS       168  DEFINED       77
 1236  CMI         COMPLEX                       REFS         9       89       93       98      123      128      131
                                                  132       162      168      176  DEFINED       18
 1304  CON         REAL                          REFS       102  DEFINED       74
 1303  E           REAL                          REFS        93      102      126      138      139      164      178
                                              DEFINED        73
    0  EL          REAL                F.P.      REFS        75      141   DEFINED        1
    0  EM          REAL                F.P.      REFS        19       71     2*72       73       79      112      147
                                                  156       190      202   DEFINED        1
 1343  EX          REAL                          REFS       162    4*164   DEFINED      161
 1240  E1          COMPLEX                       REFS         9      126   DEFINED      123
 1321  E10         REAL                          REFS       102  DEFINED      101
 1252  E12         COMPLEX                       REFS         9      102   DEFINED       98
 1242  E3          COMPLEX                       REFS         9      139   DEFINED      131
 1244  E4          COMPLEX                       REFS         9      138   DEFINED      132
 1272  E5          COMPLEX                       REFS        10      164   DEFINED      162
 1246  E6          COMPLEX                       REFS         9      178   DEFINED      176
 1250  E8          COMPLEX                       REFS         9       93   DEFINED       89
 1314  E9          REAL                          REFS        89       93   DEFINED       87       88
 1317  F           REAL                          REFS        93  DEFINED       92
 1311  I           INTEGER                       REFS        82       83       88       96      105      107      113
                                                  115       116      142      148      150      158      183      184
                                                  191       194      195      196      197      203
                                              DEFINED        81
 1341  IL          INTEGER                       REFS       158      183      186   DEFINED      157
 1313  IO          INTEGER                       REFS        87       88       93   DEFINED       86
 1320  IO1         INTEGER                       REFS       100  DEFINED       99
    0  ITAPES      INTEGER   ARRAY     CTAPES    REFS         6        7       15
 1300  ITAPEW      INTEGER                    DEFINED        15  I/O REFS      79      112      113      147      148
                                                  190       191      202      203
 1342  IX          INTEGER                       REFS       161      164   DEFINED      160
 1322  J           INTEGER                       REFS       107      113      118      142      148      151      184
                                                  191       197      203   DEFINED      106      117      150      183
                                                  196
 1334  JJ          INTEGER                       REFS       136      137      138      139  DEFINED      135
 1315  JO          INTEGER                       REFS        91  DEFINED       90
 1344  JX          INTEGER                       REFS     5*164  DEFINED      163
 1324  K           INTEGER                       REFS       117  DEFINED      116
    0  KK          INTEGER             F.P.      REFS        79      112      147      190      202
                                              DEFINED         1
 1347  KX          INTEGER                       REFS     5*178  DEFINED      177
 1326  K1          INTEGER                       REFS       122      126   DEFINED      121
 1330  K2          INTEGER                       REFS       125      126   DEFINED      124
    0  L           INTEGER  *UNUSED    F.P.   DEFINED         1
 1310  LINE        INTEGER                       REFS       110      111      112      145      146      147      188
                                                  189       190      200      201      202  DEFINED       80      110
                                                  111       145      146      188      189      200      201
```

```
      Z(1)= 1.0                                                          COFFIN   173
      Z(2)=-1.0                                                          COFFIN   174
      DO 15 MX=1,2                                                       COFFIN   175
      ARG=SQRT(XN1(MX)-S)                                                COFFIN   176
      E6= -CMI*P*Q*XN1(MX)                                               COFFIN   177
      DO 15 KX=1,NUP                                                     COFFIN   178
      XJ2T=XJ2T-Z(MX)*ARG*CEXP(E6)*WB1(KX)*COS(E*SQRT(XN1(MX)**2-(S*(1.- COFFIN   179
     1XB1(KX))+XN1(MX)*XB1(KX))**2))/SQRT(XN1(MX)*(1.+XB1(KX))+S*(1.-XB1 COFFIN   180
     2(KX)))                                                             COFFIN   181
   15 CONTINUE                                                           COFFIN   182
      XJ2T=XJ2T*BANG                                                     COFFIN   183
      IF(IL.EQ.2) J=I-1                                                  COFFIN   184
      NBOX=NORDER(I,J)                                                   COFFIN   185
      R1(NBOX)=XJ1T-XJ2T                                                 COFFIN   186
      IF(IL.EQ.2) R1(NBOX)=R1(NBOX)-R1(NBOX+1)                           COFFIN   187
      IF (.NOT.NPIF) GO TO 4                                             COFFIN   188
      LINE = LINE + 1                                                    COFFIN   189
      IF (LINE.GE.45) LINE=0                                             COFFIN   190
      IF (LINE.EQ.0) WRITE (ITAPEW,500) KK , EM , VBO                    COFFIN   191
      WRITE (ITAPEW,100) I,J,NBOX,R1(NBOX)                               COFFIN   192
    4 S = YL - 1.5                                                       COFFIN   193
  600 CONTINUE                                                           COFFIN   194
      IF(I.EQ.2) GO TO 200                                               COFFIN   195
      IF(I.GT.2) GO TO 400                                               COFFIN   196
  300 J=I-1                                                              COFFIN   197
      NBOX=NORDER(I,J)                                                   COFFIN   198
      R1(NBOX)=XJ1J2-(R1(1)+2.*R1(3))                                    COFFIN   199
      IF (.NOT.NPIF) GOTO 400                                            COFFIN   200
      LINE = LINE + 1                                                    COFFIN   201
      IF (LINE.GE.45) LINE = 0                                           COFFIN   202
      IF (LINE.EQ.0) WRITE (ITAPEW,500) KK , EM , VBO                    COFFIN   203
      WRITE (ITAPEW,100) I,J,NBOX,R1(NBOX)                               COFFIN   204
  400 CONTINUE                                                           COFFIN   205
    1 CONTINUE                                                           COFFIN   206
C                                                                        COFFIN   207
C                                                                        COFFIN   208
C FORMATS                                                                COFFIN   209
C                                                                        COFFIN   210
  100 FORMAT (5X,I5,2(3X,I5),3X2H( ,E12.4,2H, ,E12.4,2H) )               COFFIN   211
  500 FORMAT(1H1,5X52HTABLE OF PRESSURE INFLUENCE COEFFICIENTS FOR SURFA COFFIN   212
     1CE ,I2,//10X,10HMACH NO = ,F6.3,15X19HREDUCED VELOCITY = ,         COFFIN   213
     2   F7.3,/32X22HINFLUENCE COEFFICIENTS,/9X1HI,7X1HJ,                COFFIN   214
     3   4X6HBOX NO,5X20H( REAL , IMAGINARY ),//)                        COFFIN   215
C                                                                        COFFIN   216
      RETURN                                                             COFFIN   217
      END                                                                COFFIN   218
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 COFFIN	1	216

```
      5 IF(I.LT.3) GO TO 13
        K=I-2
        DO 2 J=1,K
        YL=J-1
C RECTANGULAR BOXES
        XJ1=0.0
        DO 66 K1=1,6
        A=XN+.5*XX1(K1)
        E1= -CMI*P*Q*A
        DO 66 K2=1,6
        B=SQRT(A**2-(YL+.5*XX1(K2))**2)
        XJ1=XJ1-CEXP(E1)*COS(E*B)*WX1(K1)*WX1(K2)/B
     66 CONTINUE
        XJ1=XJ1*CMI*BIG
        X1=XN-.5
        X2=XN+.5
        E3=-CMI*P*Q*X1
        E4=-CMI*P*Q*X2
        XJ21=0.0
        XJ22=0.0
        DO 35 JJ=1,6
        A5=SQRT(X2**2-(YL-XX1(JJ)/2.)**2)
        A6=SQRT(X1**2-(YL-XX1(JJ)/2.)**2)
        XJ21=XJ21+CEXP(E4)*(COS(E*A5)/A5)*WX1(JJ)
        XJ22=XJ22-CEXP(E3)*(COS(E*A6)/A6)*WX1(JJ)
     35 CONTINUE
        XJ2 =-(XJ21+XJ22)*(EL*.3183098862)*.5
        NBOX=NORDER(I,J)
        R1(NBOX)=XJ1+XJ2
        IF (.NOT.NPIF)  GO TO 2
        LINE = LINE + 1
        IF (LINE.GE.45)LINE = 0
        IF (LINE.EQ.0) WRITE (ITAPEW,500) KK, EM, VBO
        WRITE (ITAPEW,100) I,J,NBOX,R1(NBOX)
      2 CONTINUE
     13 J=I
        YL=J-1
C       TRIANGLE SOLUTION
C       TRAPEZOID SOLUTION
        S=YL-.5
        NUP=6
        IF(P.GE.1.0.AND.EM.LT.2.0) NUP=12
        DO 600 IL=1,2
        IF(I.EQ.2.AND.IL.EQ.2) GO TO 600
        XJ1T=0.
        DO 12 IX=1,6
        EX= XN-.5*XX1(IX)
        E5=-CMI*P*Q*EX
        DO 42 JX=1,NUP
        XJ1T=XJ1T-SQRT(EX-S)*CEXP(E5)*WB1(JX)*COS(E*SQRT(EX**2-(S*(1.-XB1(
       1JX))+EX*XB1(JX))**2))*WX1(IX)/SQRT(EX*(1.+XB1(JX))+S*(1.-XB1(JX)))
     42 CONTINUE
     12 CONTINUE
        XJ1T=XJ1T*CMI*P*BING
        XJ2T=0.
        XN1(1)=XN-.5
        XN1(2)=XN+.5
```

```
  710 CONTINUE                                                          COFFIN    59
      XX1(1)=.23861918                                                  COFFIN    60
      XX1(2)= -XX1(1)                                                   COFFIN    61
      XX1(3)=.66120938                                                  COFFIN    62
      XX1(4)=-XX1(3)                                                    COFFIN    63
      XX1(5)=.93246951                                                  COFFIN    64
      XX1(6)=-XX1(5)                                                    COFFIN    65
      WX1(1)=.46791393                                                  COFFIN    66
      WX1(2)=WX1(1)                                                     COFFIN    67
      WX1(3)=.36076157                                                  COFFIN    68
      WX1(4)=WX1(3)                                                     COFFIN    69
      WX1(5)=.17132449                                                  COFFIN    70
      WX1(6)=WX1(5)                                                     COFFIN    71
      BETA=SQRT(EM**2-1.)                                               COFFIN    72
      Q=EM**2/(EM**2-1.)                                                COFFIN    73
      E=P*Q/EM                                                          COFFIN    74
      CON= 1./(BETA*12.)                                                COFFIN    75
      BIG= EL*.0795774715*P                                             COFFIN    76
      BANG=1./(3.141592*BETA)                                           COFFIN    77
      BING=BANG/2.                                                      COFFIN    78
      IF (.NOT.NPIF)  GO TO 3                                           COFFIN    79
      WRITE (ITAPEW,500) KK , EM , VBO                                  COFFIN    80
      LINE = 0                                                          COFFIN    81
    3 DO 1 I=1,N                                                        COFFIN    82
      XN=I-1                                                            COFFIN    83
      IF(I.GT.1) GO TO 5                                                COFFIN    84
C     MACH CONE APEX TRIANGLE                                           COFFIN    85
  200 XJ1T=0.0                                                          COFFIN    86
      DO 50 IO=1,6                                                      COFFIN    87
      E9= (4.*XN+(1.+XX1(IO)))/2.0                                      COFFIN    88
      IF(I.EQ.2) E9=(2.*XN+1.)*(1.+XX1(IO))/2.                          COFFIN    89
      E8=-CMI*P*Q*E9/2.0                                                COFFIN    90
      DO 50 JO=1,12                                                     COFFIN    91
      AX=JO                                                             COFFIN    92
      F=COS((2.*AX-1.0)*3.141592/24.)                                   COFFIN    93
      XJ1T=XJ1T-(CMI/(4.*BETA*12.))*CEXP(E8)*COS(E*(E9/2.)*SQRT(1.-F**2) COFFIN    94
     1)*WX1(IO)*P                                                       COFFIN    95
   50 CONTINUE                                                          COFFIN    96
      IF(I.EQ.2) XJ1T=3.*XJ1T                                           COFFIN    97
      XJ2T=0.0                                                          COFFIN    98
      E12=-CMI*P*Q*(XN+.5)                                              COFFIN    99
      DO 60 IO1=1,12                                                    COFFIN   100
      AX=IO1                                                            COFFIN   101
      E10=COS((2.*AX-1.0)*3.141592/24.)                                 COFFIN   102
      XJ2T=XJ2T-CON*CEXP(E12)*COS(E*(XN+.5)*SQRT(1.-E10**2))            COFFIN   103
   60 CONTINUE                                                          COFFIN   104
      XJ1J2=XJ1T+XJ2T                                                   COFFIN   105
      IF(I.EQ.2) GO TO 300                                              COFFIN   106
      J=1                                                               COFFIN   107
      NBOX=NORDER(I,J)                                                  COFFIN   108
      R1(NBOX)=XJ1J2                                                    COFFIN   109
      IF (.NOT.NPIF)  GO TO 6                                           COFFIN   110
      LINE = LINE + 1                                                   COFFIN   111
      IF (LINE.GE.45) LINE = 0                                          COFFIN   112
      IF (LINE.EQ.0) WRITE (ITAPEW,500) KK , EM , VBO                   COFFIN   113
      WRITE (ITAPEW,100) I,J,NBOX,R1(NBOX)                              COFFIN   114
    6 GO TO 1                                                           COFFIN   115
```

```
      SUBROUTINE COFFIN (N,P,EM,L,EL,KK,VBO,NPIF)                       COFFIN     2
C                                                                       COFFIN     3
      DIMENSION XB1(12),WB1(12),XX1(6),XN1(2)                           COFFIN     4
      DIMENSION Z(2),WX1(6)                                             COFFIN     5
      DIMENSION       R1(2000)                                          COFFIN     6
      DIMENSION ITAPES(50)                                              COFFIN     7
      COMMON / CTAPES / ITAPES                                          COFFIN     8
      COMMON/CORPSE/R1                                                  COFFIN     9
      COMPLEX CMI,E1,E3,E4,E6,E8,E12,XJ1,XJ21,XJ22                      COFFIN    10
      COMPLEX XJ1J2,XJ1T,XJ2T,XJT,E5,XTRA,XJ2                           COFFIN    11
      COMPLEX R1                                                        COFFIN    12
      LOGICAL  NPIF                                                     COFFIN    13
C                                                                       COFFIN    14
C                                                                       COFFIN    15
      ITAPEW = ITAPES(6)                                                COFFIN    16
C                                                                       COFFIN    17
C                                                                       COFFIN    18
      CMI=CMPLX(0.0,1.0)                                                COFFIN    19
      IF(P.GE.1.0.AND.EM.LT.2.0) GO TO 700                              COFFIN    20
      XB1(1)=.98431659                                                  COFFIN    21
      XB1(2)=.86469999                                                  COFFIN    22
      XB1(3)=.65505762                                                  COFFIN    23
      XB1(4)=.40724987                                                  COFFIN    24
      XB1(5)=.18257199                                                  COFFIN    25
      XB1(6)=.03653872                                                  COFFIN    26
      WB1(1)=.49829408                                                  COFFIN    27
      WB1(2)=.46698506                                                  COFFIN    28
      WB1(3)=.40623484                                                  COFFIN    29
      WB1(4)=.32015664                                                  COFFIN    30
      WB1(5)=.21387864                                                  COFFIN    31
      WB1(6)=.09435066                                                  COFFIN    32
      GO TO 710                                                         COFFIN    33
  700 CONTINUE                                                          COFFIN    34
      XB1(1)=.99589671                                                  COFFIN    35
      XB1(2)=.96347358                                                  COFFIN    36
      XB1(3)=.90074812                                                  COFFIN    37
      XB1(4)=.81182320                                                  COFFIN    38
      XB1(5)=.70251542                                                  COFFIN    39
      XB1(6)=.57997462                                                  COFFIN    40
      XB1(7)=.45221618                                                  COFFIN    41
      XB1(8)=.32759675                                                  COFFIN    42
      XB1(9)=.21426753                                                  COFFIN    43
      XB1(10)=.11964087                                                 COFFIN    44
      XB1(11)=.04990425                                                 COFFIN    45
      XB1(12)=.00960242                                                 COFFIN    46
      WB1(1)=.25587638                                                  COFFIN    47
      WB1(2)=.25167490                                                  COFFIN    48
      WB1(3)=.24334094                                                  COFFIN    49
      WB1(4)=.23101132                                                  COFFIN    50
      WB1(5)=.21488854                                                  COFFIN    51
      WB1(6)=.19523730                                                  COFFIN    52
      WB1(7)=.17238032                                                  COFFIN    53
      WB1(8)=.14669296                                                  COFFIN    54
      WB1(9)=.11859716                                                  COFFIN    55
      WB1(10)=.08855486                                                 COFFIN    56
      WB1(11)=.05706276                                                 COFFIN    57
      WB1(12)=.02468244                                                 COFFIN    58
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      TOMB         2162               0 XW      (350)        350 YW      (350)        700 NDB     (1)
                                    701 LS      (5)          706 XMX     (5)          711 NWB     (1)
                                    712 AD      (250)        962 XD      (250)       1212 YD      (250)
                                   1462 IND     (350)       1812 AW      (350)
      CTAPES         50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 1723B      979
  CM LABELED COMMON LENGTH       4244B     2212
        52000B CM USED
```

```
VARIABLES      SN  TYPE          RELOCATION
  306  IY2         INTEGER                            REFS        62   DEFINED      61
  266  JCD      *  INTEGER                            REFS        23
    0  KK          INTEGER              F.P.          REFS        23        42       43   DEFINED       1
  301  KOUNT       INTEGER                            REFS        46        54  DEFINED       45          63
 1275  LS          INTEGER    ARRAY    TOMB           REFS        11
  273  MAX         INTEGER                            REFS        30   DEFINED      29
  264  MTAP9       INTEGER                            REFS        23        30  DEFINED       21
  421  NAME        INTEGER    ARRAY                   REFS         7        23
 1274  NDB         INTEGER             TOMB           REFS        11
    0  NS          INTEGER              F.P.          REFS        27   DEFINED       1
 1307  NWB         INTEGER             TOMB           REFS        11        25       29       32          46          54
  377  QHOL        REAL       ARRAY                   REFS         5        59  DEFINED       16
  300  X           REAL                               REFS        47        55       64       65   DEFINED          44          64
 1702  XD          REAL       ARRAY    TOMB           REFS        11
  267  XMAX        REAL                               REFS        26        65  DEFINED       24          26
 1302  XMX         REAL       ARRAY    TOMB           REFS        11
    0  XW          REAL       ARRAY    TOMB           REFS        11        26       47       55
 2274  YD          REAL       ARRAY    TOMB           REFS        11
  536  YW          REAL       ARRAY    TOMB           REFS        11        48       58
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       ALOG10      REAL       1 LIBRARY      39
       GEDLAB                 6              23
       GETROW                 4              30

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE  REFERENCES
       ABS         REAL       1  INTRIN             35          52
       AIMAG       REAL       1  INTRIN             34          51
       AMAX1       REAL       0  INTRIN             26          35
       MINO        INTEGER    0  INTRIN             61
       REAL        REAL       1  INTRIN             33          50
       SIGN        REAL       2  INTRIN             40

STATEMENT LABELS              DEF LINE   REFERENCES
    0  1                          68         27
    0  2                          35         32
   65  3                          42         37          38
  130  4                          53         46          47
    0  5                          56         54
  142  6                          58         55
    0  10                         26         25
  232  100      FMT               73         42
  244  110      FMT               75         43
   31  200                        31         67
   77  300                        46         65
  162  400                        64         57

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   17  10        I           25 26         4B       INSTACK
   25  1         IM          27 68       146B                EXT REFS  NOT INNER
   42  2         I           32 35        11B          OPT
  101  4         I           46 53        32B                EXT REFS
  134  5         I           54 56         5B       INSTACK    EXITS
```

```
    6 IYY  =  YW(I)                                                      DSPMD       59
      FMT(2)  =  QHOL (IYY+1)                                            DSPMD       60
      IY1  =  IYY + 1                                                    DSPMD       61
      IY2  =  MINO (18, IY)                                              DSPMD       62
      WRITE (ITAPEW,FMT)   (H(I) , I=IY1,IY2)                            DSPMD       63
      KOUNT  =  IK + 1                                                   DSPMD       64
  400 X  =  X + 1.0                                                      DSPMD       65
      IF ( X .LE. XMAX )       GO TO 300                                 DSPMD       66
      ICAP  =  ICAP + 1                                                  DSPMD       67
      IF ( ICAP .EQ. 2 )       GO TO 200                                 DSPMD       68
    1 CONTINUE                                                           DSPMD       69
C                                                                        DSPMD       70
C                                                                        DSPMD       71
C FORMATS                                                                DSPMD       72
C                                                                        DSPMD       73
  100 FORMAT (1H1,10X35HMODAL DEFLECTION MULTIPLIED BY 1.0E, I3,         DSPMD       74
     1      2X,9HFOR MODE ,I3,5X12HFOR SURFACE ,I3, ///)                 DSPMD       75
  110 FORMAT (1H1,10X31HMODAL SLOPES MULTIPLIED BY 1.0E, I3,             DSPMD       76
     1      2X,9HFOR MODE ,I3,5X12HFOR SURFACE ,I3 ///)                  DSPMD       77
C                                                                        DSPMD       78
      RETURN                                                             DSPMD       79
      END                                                                DSPMD       80
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DSPMD          1            78

VARIABLES      SN  TYPE            RELOCATION
   277  AA         REAL                               REFS      2*40   DEFINED     39
  1310  AD         REAL       ARRAY     TOMB          REFS        11
  3424  AW         REAL       ARRAY     TOMB          REFS        11
   423  DWSH       COMPLEX    ARRAY                   REFS         9       30       33       34       50       51
   371  FMT        REAL       ARRAY                   REFS         5       62   DEFINED     15       59
   307  H          REAL       ARRAY                   REFS         5       52       62   DEFINED     50       51       52
   275  HH         REAL                               REFS        35   DEFINED     33       34
   274  HMAX       REAL                               REFS        35     2*37       38       39   DEFINED     31       35
   270  I          INTEGER                            REFS        26       33       34       47       48       49       50
                                                        51        55       58       62   DEFINED     25       32       46
                                                        54        62
   272  ICAP       INTEGER                            REFS        33       34       42       43       50       51       66
                                                        67   DEFINED       28       66
   303  IK         INTEGER                            REFS        63   DEFINED     49
   271  IM         INTEGER                            REFS        42       43   DEFINED     27
  2666  IND        INTEGER    ARRAY     TOMB          REFS        11
   265  IRD      * INTEGER                            REFS        23
   276  ISCL       INTEGER                            REFS        41       42       43       50       51
                                                   DEFINED        36       40       41
     0  ITAPES     INTEGER    ARRAY     CTAPES        REFS         6       13       20       21
   263  ITAPEW     INTEGER                         DEFINED        20  I/O REFS      42       43       62
   302  IY         INTEGER                            REFS        50       51     2*52       61   DEFINED     48
   304  IYY        INTEGER                            REFS        59       60   DEFINED     58
   305  IY1        INTEGER                            REFS        62   DEFINED     60
```

```
      SUBROUTINE DSPMD ( KK , NS )                                       DSPMD       2
C                                                                        DSPMD       3
C     PROVIDES DISPLAY OF MODAL DEFLECTIONS                              DSPMD       4
C                                                                        DSPMD       5
      DIMENSION          H(50) ,       FMT(6) ,     QHOL(18)             DSPMD       6
      DIMENSION ITAPES(50)                                               DSPMD       7
      DIMENSION         NAME(2)                                          DSPMD       8
C                                                                        DSPMD       9
      COMPLEX        DWSH(350)                                           DSPMD      10
C                                                                        DSPMD      11
      COMMON /TOMB/ XW(350) , YW(350) , NDB , LS(5) , XMX(5) , NWB ,     DSPMD      12
     1              AD(250) , XD(250) , YD(250) ,IND(350) , AW(350)      DSPMD      13
      COMMON / CTAPES / ITAPES                                           DSPMD      14
C                                                                        DSPMD      15
      DATA FMT /4H(    ,4H    ,4HX,   ,4H18(1,4HX,F6,4H.3))/             DSPMD      16
      DATA QHOL /1H2,1H9,2H16,2H23,2H30,2H37,2H44,2H51,2H58,2H65,2H72,   DSPMD      17
     1           2H79,2H86,2H93,3H100,3H107,3H114,3H121/                 DSPMD      18
C                                                                        DSPMD      19
C                                                                        DSPMD      20
      ITAPEW = ITAPES(6)                                                 DSPMD      21
      MTAP9  =  ITAPES(29)                                               DSPMD      22
C                                                                        DSPMD      23
      CALL GEDLAB(8HDSPMD 01,MTAP9,NAME,KK,IRD,JCD)                      DSPMD      24
      XMAX  =  0.0                                                       DSPMD      25
      DO 10  I =1,NWB                                                    DSPMD      26
   10 XMAX  =  AMAX1 (XMAX,XW(I))                                        DSPMD      27
      DO 1  IM = 1,NS                                                    DSPMD      28
      ICAP  =  1                                                         DSPMD      29
      MAX=2*NWB                                                          DSPMD      30
      CALL GETROW(MTAP9,1,DWSH,MAX)                                      DSPMD      31
  200 HMAX  =  0.0                                                       DSPMD      32
      DO 2  I = 1,NWB                                                    DSPMD      33
      IF ( ICAP .EQ. 1 )      HH = REAL (DWSH(I))                        DSPMD      34
      IF ( ICAP .EQ. 2 )      HH = AIMAG(DWSH(I))                        DSPMD      35
    2 HMAX  =  AMAX1 ( HMAX , ABS(HH) )                                  DSPMD      36
      ISCL  =  0                                                         DSPMD      37
      IF ( HMAX .GE. 1.0 .AND. HMAX .LT. 10.0 )   GO TO 3                DSPMD      38
      IF ( HMAX .EQ. 0.0 )                        GO TO 3                DSPMD      39
      AA  =  ALOG10 (HMAX)                                               DSPMD      40
      ISCL  =  AA - 0.5 + SIGN (0.5,AA)                                  DSPMD      41
      ISCL  =  - ISCL                                                    DSPMD      42
    3 IF ( ICAP .EQ. 1 )      WRITE (ITAPEW,100)  ISCL , IM , KK         DSPMD      43
      IF ( ICAP .EQ. 2 )      WRITE (ITAPEW,110)  ISCL , IM , KK         DSPMD      44
      X   =  0.0                                                         DSPMD      45
      KOUNT  =  1                                                        DSPMD      46
  300 DO 4  I = KOUNT,NWB                                                DSPMD      47
      IF ( XW(I) .NE. X )     GO TO 4                                    DSPMD      48
      IY  =  YW(I) + 1                                                   DSPMD      49
      IK  =  I                                                           DSPMD      50
      IF ( ICAP .EQ. 1 )      H(IY)  =  REAL (DWSH(I)) * 10.0**ISCL      DSPMD      51
      IF ( ICAP .EQ. 2 )      H(IY)  = AIMAG (DWSH(I)) * 10.0**ISCL      DSPMD      52
      IF ( ABS(H(IY)) .LT. 0.001 )      H(IY)  =  0.0                    DSPMD      53
    4 CONTINUE                                                           DSPMD      54
      DO 5  I = KOUNT,NWB                                                DSPMD      55
      IF (XW(I) .EQ. X)  GOTO  6                                         DSPMD      56
    5 CONTINUE                                                           DSPMD      57
      GO TO 400                                                          DSPMD      58
```

```
   1                SUBROUTINE ORDS (X)                                                    ORDS         2
                    IF (X.NE.0.0) GO TO 10                                                 ORDS         3
                    X = X - 0.001                                                          ORDS         4
                    GO TO 20                                                               ORDS         5
   5             10 IX = X                                                                 ORDS         6
                    AX = IX                                                                ORDS         7
                    IF (AX.EQ.X) X = X + 0.001                                             ORDS         8
                 20 RETURN                                                                 ORDS         9
                    END                                                                    ORDS        10


   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  ORDS           1             8

VARIABLES      SN  TYPE            RELOCATION
   20  AX          REAL                             REFS         7   DEFINED       6
   17  IX          INTEGER                          REFS         6   DEFINED       5
    0  X           REAL                  F.P.       REFS         2         3       5       2*7   DEFINED       1       3
                                                        7

STATEMENT LABELS            DEF LINE   REFERENCES
   10  10                        5          2
   15  20                        8          4

STATISTICS
  PROGRAM LENGTH                21B       17
        52000B CM USED
```

```
COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CHSP          1                0 KDEG    (1)
       CTAPES       50                0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 7723B     4051
  CM LABELED COMMON LENGTH     245458B    10597
          52C00B CM USED
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
 1455  666      FMT              313        269       278
 1463  667      FMT              314        270       279
 1471  668      FMT              315        271       280
 1477  669      FMT              316        272       281
 1516  670      FMT              320        289
 1522  718      FMT              321        121
 1526  778      FMT   NO REFS    322
  333  862                       136        133
  607  875                       212        181       201
  554  876                       200        190       192       197
    0  1080                      290        266
    0  1082                       71         52
    0  1083                       70         64
    0  1090                      289        274
 1052  1100                      325        263       264
    0  1999                       46         43

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   32  1999     JJ          43  46       6B     INSTACK
   46  1082     I           52  71      63B                EXT REFS  NOT INNER
  113  1083     JK          64  70      12B        OPT
  145  77       K           76  80      12B        OPT
  177  1        I           89 125     117B                EXT REFS  NOT INNER
  266  10       J          114 122      26B                EXT REFS
  322  150      M          130 215     276B                EXT REFS  NOT INNER
  337  15       K          138 149      36B                NOT INNER
  366  15       L          146 149       3B     INSTACK
  400  17       K          152 167      46B                NOT INNER
  435  17       L          162 167       6B     INSTACK
  456  60       J          171 179      27B                EXT REFS  NOT INNER
  461  60       K          173 179      22B                EXT REFS
  507  875      KL         181 212     103B                EXT REFS  NOT INNER
  516  22       I          183 185       4B     INSTACK
  531  876      MM         190 200      26B                NOT INNER
  540  30       II         194 196      10B        OPT       EXITS
  571  6        LM         203 211      14B        OPT
  626  570      M          219 260     127B                EXT REFS  NOT INNER
  635  34       II         221 222       2B     INSTACK
  641  120      I          224 259     107B                EXT REFS  NOT INNER
  645  32       II         227 229      10B        OPT       EXITS
  663  5        J          233 238       6B     INSTACK
  704  8        J          242 250      13B        OPT
  727  9        J          253 258      15B        OPT
  770  1080     J          266 290      62B                EXT REFS  NOT INNER
 1010  1090     II         274 289      40B                EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       MODD       8041             0 XJUNK  (8040)        8040 NC      (1)
       COMA         41             0 LC     (40)            40 BR      (1)
       TOMB       2162             0 XW     (350)          350 YW      (350)         700 NDB     (1)
                                 701 LS     (5)            706 XMAX    (5)           711 NWB     (1)
                                 712 AD     (250)          962 XD      (250)        1212 YD      (250)
                                1462 IND    (350)         1812 AW      (350)
       JUNK         81             0 XTERM1 (20)            20 XTERM2  (20)           40 YTERM1  (20)
                                  60 YTERM2 (20)            80 DIST    (1)
       CNTRL       221             0 X1     (5)              5 X2      (5)            10 Y1      (5)
                                  15 Y2     (5)             20 XC      (200)         220 NCF     (1)
```

```
      1                FUNCTION NORDER(I,J)                                                NORDER       2
                       NORDER = (I*(I-1))/2+J                                              NORDER       3
                       RETURN                                                              NORDER       4
                       END                                                                 NORDER       5


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    4  NORDER         1            3

VARIABLES      SN  TYPE            RELOCATION
    0  I           INTEGER              F.P.        REFS        2*2    DEFINED       1
    0  J           INTEGER              F.P.        REFS         2     DEFINED       1
   12  NORDER      INTEGER                       DEFINED         2

STATISTICS
  PROGRAM LENGTH                   13B        11
          52000B CM USED
```

```
      SUBROUTINE RIP (NQ,OSA,P,ES,KDWSH)                              RIP    2
C                                                                     RIP    3
      DIMENSION        XW(350) ,      YW(350) ,      XD(250)          RIP    4
      DIMENSION        YD(250) ,      AW(350) ,      AD(250)          RIP    5
      DIMENSION         X(350) ,    R1(2000) ,       H(350)           RIP    6
      DIMENSION       IND(350) ,       LS(5) ,      XMAX(5)           RIP    7
      DIMENSION        PP(350)                                        RIP    8
      DIMENSION ITAPES(50)                                            RIP    9
      COMMON / CTAPES / ITAPES                                        RIP   10
      COMMON/CORPSE/R1                                                RIP   11
      COMMON/TOMB/XW,YW,NDB,LS,XMAX,NWB,AD,XD,YD,IND,AW               RIP   12
      COMPLEX                W ,         PP ,         TEMP            RIP   13
      COMPLEX               R1 ,          X ,          ACC            RIP   14
      COMPLEX            TEMP1 ,         XX ,            H            RIP   15
C                                                                     RIP   16
C                                                                     RIP   17
C                                                                     RIP   18
C INITIAL CONDITIONS                                                  RIP   19
C                                                                     RIP   20
      MTAP2  =  ITAPES(22)                                            RIP   21
      MTAP9  =  ITAPES(29)                                            RIP   22
      MTAP11 =  ITAPES(31)                                            RIP   23
      MTAP12 =  ITAPES(32)                                            RIP   24
C                                                                     RIP   25
C                                                                     RIP   26
      IF ( KDWSH .NE. O .AND. NDB .NE. O )   REWIND MTAP2             RIP   27
      REWIND MTAP11                                                   RIP   28
      DO 1 L = 1,NQ                                                   RIP   29
      CALL CNRW (-MTAP9,H,NWB)                                        RIP   30
                                                                      RIP   31
                                                                      RIP   32
                                                                      RIP   33
      DO 70 II=1,NWB                                                  RIP   34
      PP(II)    =  0.0                                                RIP   35
      DO 15 J=1,II                                                    RIP   36
C     WING DUE WING                                                   RIP   37
      ENJ = XW(II)-XW(J)                                              RIP   38
      ELJ = ABS(YW(II)-YW(J))                                         RIP   39
      IF (ELJ.GT.ENJ) GO TO 15                                        RIP   40
      NJ = ENJ + 1.0                                                  RIP   41
      LJ = ELJ + 1.0                                                  RIP   42
      TEMP1=R1(NORDER(NJ,LJ))                                         RIP   43
      ELJ = YW(II)+YW(J)+1.0                                          RIP   44
      IF(ELJ.GT.ENJ) GO TO 90                                         RIP   45
      LJ = ELJ+1.0                                                    RIP   46
      TEMP=R1(NORDER(NJ,LJ))                                          RIP   47
      GO TO 91                                                        RIP   48
   90 TEMP = TEMP1                                                    RIP   49
      GO TO 94                                                        RIP   50
   91 TEMP = TEMP1+(TEMP*OSA)                                         RIP   51
   94 XI        =  REAL (H(J)) * P / ES                               RIP   52
      ALP       =  AIMAG (H(J))                                       RIP   53
      W = CMPLX (ALP,XI)                                              RIP   54
      IF (AW(J) .NE. 1.0) GO TO 16                                    RIP   55
      PP(II)    =  PP(II) + TEMP * W                                  RIP   56
      GO TO 15                                                        RIP   57
   16 PP(II)    =  PP(II) + TEMP * W * AW(J)                          RIP   58
```

```
   15 CONTINUE                                                   RIP      59
      IF(NDB.EQ O) GO TO 65                                      RIP      60
      IF(II.GT.1) GO TO 50                                       RIP      61
      DO 45 I=1,NDB                                              RIP      62
      X(I)      =  0.0                                           RIP      63
C     DIAPHRAGM DUE WING                                         RIP      64
      DO 25 JJ=1,NWB                                             RIP      65
      ENJ = XD(I)-XW(JJ)                                         RIP      66
      IF (ENJ.LT.0.0) GO TO 26                                   RIP      67
      ELJ = ABS(YD(I)-YW(JJ))                                    RIP      68
      IF (ELJ.GT.ENJ) GO TO 25                                   RIP      69
      NJ = ENJ + 1.0                                             RIP      70
      LJ = ELJ + 1.0                                             RIP      71
      TEMP1=R1(NORDER(NJ,LJ))                                    RIP      72
      ELJ = YD(I) + YW(JJ) + 1.0                                 RIP      73
      IF(ELJ.GT.ENJ) GO TO 84                                    RIP      74
      LJ = ELJ + 1.0                                             RIP      75
      TEMP=R1(NORDER(NJ,LJ))                                     RIP      76
      GO TO 81                                                   RIP      77
   84 TEMP = TEMP1                                               RIP      78
      GO TO 80                                                   RIP      79
   81 TEMP = TEMP1 + (TEMP*OSA)                                  RIP      80
   80 XI        =  REAL (H(JJ)) * P / ES                         RIP      81
      ALP       =  AIMAG (H(JJ))                                 RIP      82
      W = CMPLX (ALP,XI)                                         RIP      83
      IF ( AW(JJ) .NE. 1.0 )  TEMP = TEMP * AW(JJ)               RIP      84
      X(I)   =   X(I) + TEMP * W                                 RIP      85
   25 CONTINUE                                                   RIP      86
   26 XX        =  0.0                                           RIP      87
      IF(I.EQ.1) GO TO 40                                        RIP      88
      N=I-1                                                      RIP      89
      DO 35 J=1,N                                                RIP      90
C     DIAPHRAGM DUE DIAPHRAGM                                    RIP      91
      ENJ = XD(I)-XD(J)                                          RIP      92
      ELJ = ABS(YD(J)-YD(I))                                     RIP      93
      IF (ELJ.GT.ENJ) GO TO 35                                   RIP      94
      NJ = ENJ + 1.0                                             RIP      95
      LJ = ELJ + 1.0                                             RIP      96
      TEMP1=R1(NORDER(NJ,LJ))                                    RIP      97
      ELJ = YD(J)+YD(I)+1.0                                      RIP      98
      IF(ELJ.GT.ENJ) GO TO 95                                    RIP      99
      LJ = ELJ + 1.0                                             RIP     100
      TEMP=R1(NORDER(NJ,LJ))                                     RIP     101
      GO TO 93                                                   RIP     102
   95 TEMP = TEMP1                                               RIP     103
      GO TO 2                                                    RIP     104
   93 TEMP = TEMP1 + (TEMP*OSA)                                  RIP     105
    2 IF ( AD(J) .NE. 1.0 )   TEMP = TEMP * AD(J)                RIP     106
      XX   =   XX + TEMP * X(J)                                  RIP     107
   35 CONTINUE                                                   RIP     108
   40 X(I)      =  (X(I) - XX) / R1(1)                           RIP     109
      IF ( AD(I) .NE. 1.0 )   X(I) = X(I) / AD(I)                RIP     110
   45 CONTINUE                                                   RIP     111
      IF ( KDWSH .EQ. O )     GO TO 50                           RIP     112
      CALL CNRW (MTAP2,X,NDB)                                    RIP     113
   50 DO 60 IJ=1,NDB                                             RIP     114
C     WING DUE DIAPHRAGM                                         RIP     115
```

```
      ENJ=XW(II)-XD(IJ)                                      RIP  116
      IF (ENJ.LT.O.O) GO TO 65                               RIP  117
      ELJ = ABS(YW(II)-YD(IJ))                               RIP  118
      IF (ELJ.GT.ENJ) GO TO 60                               RIP  119
      NJ = ENJ + 1.0                                         RIP  120
      LJ = ELJ + 1.0                                         RIP  121
      TEMP1=R1(NORDER(NJ,LJ))                                RIP  122
      ELJ = ABS(YW(II)+YD(IJ)+1.0)                           RIP  123
      IF(ELJ.GT.ENJ) GO TO 85                                RIP  124
      LJ = ELJ + 1.0                                         RIP  125
      TEMP=R1(NORDER(NJ,LJ))                                 RIP  126
      GO TO 83                                               RIP  127
   85 TEMP = TEMP1                                           RIP  128
      GO TO 3                                                RIP  129
   83 TEMP = TEMP1 + (TEMP*OSA)                              RIP  130
    3 IF ( AD(IJ) .NE. 1.0 )  TEMP = TEMP * AD(IJ)           RIP  131
      PP(II)  =  PP(II) - TEMP * X(IJ)                       RIP  132
   60 CONTINUE                                               RIP  133
   65 PP(II)   =  4.0 * PP(II)                               RIP  134
   70 CONTINUE                                               RIP  135
      CALL CNRW (MTAP12,PP,NWB)                              RIP  136
    1 CONTINUE                                               RIP  137
      IF ( KDWSH .NE.O .AND. NDB .NE. O )    REWIND MTAP2    RIP  138
      RETURN                                                 RIP  139
      END                                                    RIP  140
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE     REFERENCES
    3  RIP               1        138

VARIABLES     SN  TYPE          RELOCATION
  507  ACC     *  COMPLEX   *UNDEF             REFS        13
 1310  AD         REAL       ARRAY     TOMB    REFS         4      11    2*105   2*109   2*130
  531  ALP        REAL                         REFS        53      82  DEFINED     52      81
 3424  AW         REAL       ARRAY     TOMB    REFS         4      11      54      57    2*83
  525  ELJ        REAL                         REFS        39      41      44      45      68      70      73
                                                 74        93      95      98      99     118     120     123
                                                124   DEFINED      38      43      67      72      92      97
                                                117       122
  524  ENJ        REAL                         REFS        39      40      44      66      68      69      73
                                                 93        94      98     116     118     119     123
                                            DEFINED        37      65      91     115
    0  ES         REAL                 F.P.    REFS        51      80  DEFINED      1
 2032  H          COMPLEX    ARRAY             REFS         5      14      29      51      52      80      81
  532  I          INTEGER                      REFS        62      65      67      72    2*84      87      88
                                                 91        92      97   2*108   4*109 DEFINED      61
  522  II         INTEGER                      REFS        34      35      37      38      43    2*55    2*57
                                                 60       115     117     122   2*131   2*133
                                            DEFINED        33
  535  IJ         INTEGER                      REFS       115     117     122   2*130     131
                                            DEFINED       113
 2666  IND        INTEGER    ARRAY     TOMB    REFS         6      11
```

```
VARIABLES      SN  TYPE            RELOCATION
     0  ITAPES     INTEGER   ARRAY   CTAPES      REFS        8       9      20      21      22      23
   523  J          INTEGER                       REFS       37      38      43      51      52      54      57
                                                   91       92      97   2*105     106  DEFINED     35      89
   533  JJ         INTEGER                       REFS       65      67      72      80      81    2*83
                                              DEFINED       64
     0  KDWSH      INTEGER           F.P.        REFS       26     111     137  DEFINED       1
   521  L       *  INTEGER                    DEFINED       28
   527  LJ         INTEGER                       REFS       42      46      71      75      96     100     121
                                                  125  DEFINED      41      45      70      74      95      99
                                                  120      124
  1275  LS         INTEGER   ARRAY   TOMB        REFS        6      11
   517  MTAP11     INTEGER                    DEFINED       22  I/O REFS    27
   520  MTAP12     INTEGER                       REFS      135  DEFINED     23
   515  MTAP2      INTEGER                       REFS      112  DEFINED     20  I/O REFS     26     137
   516  MTAP9      INTEGER                       REFS       29  DEFINED     21
   534  N          INTEGER                       REFS       89  DEFINED     88
  1274  NDB        INTEGER           TOMB        REFS       11      26      59      61     112     113     137
   526  NJ         INTEGER                       REFS       42      46      71      75      96     100     121
                                                  125  DEFINED      40      69      94     119
     0  NQ         INTEGER           F.P.        REFS       28  DEFINED      1
  1307  NWB        INTEGER           TOMB        REFS       11      29      33      64     135
     0  OSA        REAL              F.P.        REFS       50      79     104     129  DEFINED       1
     0  P          REAL              F.P.        REFS       51      80  DEFINED      1
  3326  PP         COMPLEX   ARRAY               REFS        7      12      55      57     131     133     135
                                              DEFINED       34      55      57     131     133
     0  R1         COMPLEX   ARRAY   CORPSE      REFS        5      10      13      42      46      71      75
                                                   96      100     108     121     125
   505  TEMP       COMPLEX                       REFS       12      50      55      57      79      83      84
                                                  104      105     106     129     130     131
                                              DEFINED       46      48      50      75      77      79      83
                                                  100      102     104     105     125     127     129     130
   511  TEMP1      COMPLEX                       REFS       14      48      50      77      79     102     104
                                                  127      129  DEFINED     42      71      96     121
   503  W          COMPLEX                       REFS       12      55      57      84  DEFINED     53      82
   536  X          COMPLEX   ARRAY               REFS        5      13      84     106     108     109     112
                                                  131  DEFINED      62      84     108     109
  1702  XD         REAL      ARRAY   TOMB        REFS        3      11      65    2*91     115
   530  XI         REAL                          REFS       53      82  DEFINED     51      80
  1302  XMAX       REAL      ARRAY   TOMB        REFS        6      11
     0  XW         REAL      ARRAY   TOMB        REFS        3      11    2*37      65     115
   513  XX         COMPLEX                       REFS       14     106     108  DEFINED     86     106
  2274  YD         REAL      ARRAY   TOMB        REFS        4      11      67      72    2*92    2*97     117
                                                  122
   536  YW         REAL      ARRAY   TOMB        REFS        3      11    2*38    2*43      67      72     117
                                                  122
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS       REFERENCES
        CNRW                  3             29      112     135
        NORDER      INTEGER   2             42       46      71      75      96     100     121     125

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE  REFERENCES
        ABS         REAL      1  INTRIN              38      67      92     117     122
        AIMAG       REAL      1  INTRIN              52      81
        CMPLX       COMPLEX   2  INTRIN              53      82
        REAL        REAL      1  INTRIN              51      80
```

```
STATEMENT LABELS              DEF LINE    REFERENCES
    0  1                         136         28
  304  2                         105        103
  415  3                         130        128
  127  15                         58         35         39         56
  116  16                         57         54
  230  25                         85         64         68
  233  26                         86         66
  321  35                        107         89         93
  324  40                        108         87
    0  45                        110         61
  346  50                        113         60        111
  432  60                        132        113        118
  435  65                        133         59        116
    0  70                        134         33
  206  80                         80         78
  201  81                         79         76
  410  83                        129        126
  176  84                         77         73
  405  85                        127        123
   67  90                         48         44
   72  91                         50         47
  277  93                        104        101
   77  94                         51         49
  274  95                        102         98

LOOPS   LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   24   1         L           28 136       424B               EXT REFS  NOT INNER
   30   70        II          33 134       413B               EXT REFS  NOT INNER
   33   15        J           35 58         77B               EXT REFS
  136   45        I           61 110       206B               EXT REFS  NOT INNER
  141   25        JJ          64 85         72B               EXT REFS    EXITS
  240   35        J           89 107        64B               EXT REFS
  347   60        IJ         113 132        66B               EXT REFS    EXITS

COMMON BLOCKS     LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTAPES         50               0 ITAPES (50)
       CORPSE       4000               0 R1     (4000)
       TOMB         2162               0 XW     (350)         350 YW      (350)         700 NDB     (1)
                                     701 LS     (5)           706 XMAX    (5)           711 NWB     (1)
                                     712 AD     (250)         962 XD      (250)        1212 YD      (250)
                                    1462 IND    (350)        1812 AW      (350)

STATISTICS
  PROGRAM LENGTH                4635B     2461
  CM LABELED COMMON LENGTH     14104B     6212
          52000B CM USED
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```
      SUBROUTINE TRIP (OSA,NQ,LINC,LSVT,NKF,P,ES,VBO,KDWSH)              TRIP       2
C     ARRAYS WRITTEN ON UNITS 11 AND 14                                  TRIP       3
C                                                                        TRIP       4
C     INFLUENCE COEFFICIENT ARRAY FORMULATION                            TRIP       5
C                                                                        TRIP       6
      COMPLEX  CDWD (350) , CWD (350) , CINF (350) , COBB , COMSCA        TRIP       7
      COMPLEX  R1(2000), CDD(350), CDW(350), PP(350), DWSH(350)          TRIP       8
      COMPLEX  TEMP , TEMP1                                              TRIP       9
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS TRIP      10
C     COMPLEX*16    COB    ,DCMPLF                                       TRIP      11
C     DOUBLE PRECISION ARG1,ARG2                                         TRIP      12
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    TRIP      13
CCDC  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS TRIP      14
      COMPLEX       COB    ,DCMPLF                                       TRIP      15
CCDC  ENDING OF TYPE STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS    TRIP      16
      COMMON /CTAPES/  ITAPES                                            TRIP      17
      COMMON /CORPSE/ R1                                                 TRIP      18
      COMMON /TOMB/ XW (350) , YW (350) , NDB , LS(5) , XMAX(5) , NWB ,  TRIP      19
     1 AD (250) , XD (250) , YD(250) , IND (350) , AW (350)              TRIP      20
      DIMENSION ITAPES(50)                                               TRIP      21
      EQUIVALENCE   (PP(1) , CDWD(1))  ,  (DWSH(1) , CDW(1))             TRIP      22
      MTAP2  =  ITAPES(22)                                               TRIP      23
      MTAP8  =  ITAPES(28)                                               TRIP      24
      MTAP9  =  ITAPES(29)                                               TRIP      25
      MTAP11 =  ITAPES(31)                                               TRIP      26
      MTAP12 =  ITAPES(32)                                               TRIP      27
      MTAP14 =  ITAPES(34)                                               TRIP      28
      ITAPEW =  ITAPES(6)                                                TRIP      29
      REWIND MTAP14                                                      TRIP      30
      ARG1 = 0.0                                                         TRIP      31
      ARG2 = 0.0                                                         TRIP      32
      IF ( LSVT .NE. 0 )      GO TO 200                                  TRIP      33
      IF (  NDB .NE. 0 )   REWIND MTAP2                                  TRIP      34
C                                                                        TRIP      35
      LINE = 0                                                           TRIP      36
      IF (LINC.NE.0) WRITE (ITAPEW,101)                                  TRIP      37
      IF (NDB.EQ.0) GO TO 100                                            TRIP      38
      IACC  =  0                                                         TRIP      39
C                                                                        TRIP      40
C     MATRIX PRODUCT OF INVERSE OF DIAPHRAGM ON DIAPHRAGM                TRIP      41
C     AND DIAPHRAGM ON WING                                              TRIP      42
C                                                                        TRIP      43
      DO 4 I = 1,NWB                                                     TRIP      44
C                                                                        TRIP      45
C     INFLUENCE COEFFICIENTS FOR DIAPHRAGM DUE WING                      TRIP      46
C                                                                        TRIP      47
      DO 9 JJ = 1,NDB                                                    TRIP      48
      CDW(JJ) = CMPLX(0.0,0.0)                                           TRIP      49
      ENJ = XD(JJ) - XW(I)                                               TRIP      50
      IF ( ENJ .LT. 0.0 )     GO TO 9                                    TRIP      51
      ELJ = ABS (YD(JJ) - YW(I))                                         TRIP      52
      IF ( ELJ .GT. ENJ )     GO TO 9                                    TRIP      53
      NJ = ENJ + 1.0                                                     TRIP      54
      LJ = ELJ + 1.0                                                     TRIP      55
      TEMP1  =  R1 (NORDER(NJ,LJ))                                       TRIP      56
      ELJ = YD(JJ) + YW(I) + 1.0                                         TRIP      57
      IF ( ELJ .GT. ENJ )     TEMP = TEMP1                               TRIP      58
```

```
      IF ( ELJ .GT. ENJ )      GO TO 30                                  TRIP      59
      LJ = ELJ + 1.0                                                     TRIP      60
      TEMP    =  R1 (NORDER(NJ,LJ)) * OSA + TEMP1                        TRIP      61
   30 IF ( AW(I) .NE. 1 )      TEMP = TEMP * AW(I)                       TRIP      62
      CDW(JJ)  =  TEMP                                                   TRIP      63
    9 CONTINUE                                                           TRIP      64
      DO 6  K = 1,NDB                                                    TRIP      65
C                                                                        TRIP      66
C     INFLUENCE COEFFICIENTS FOR DIAPHRAGM DUE DIAPHRAGM                 TRIP      67
C                                                                        TRIP      68
      DO 2  J = 1,K                                                      TRIP      69
      CDD(J) = CMPLX(0.0,0.0)                                            TRIP      70
      ENJ  =  XD(K) - XD(J)                                              TRIP      71
      IF ( ENJ .LT. 0.0 )      GO TO 2                                   TRIP      72
      ELJ  =   ABS (YD(J) - YD(K))                                       TRIP      73
      IF ( ELJ .GT. ENJ )      GO TO 2                                   TRIP      74
      NJ  =  ENJ + 1.0                                                   TRIP      75
      LJ  =  ELJ + 1.0                                                   TRIP      76
      TEMP1  =  R1 (NORDER(NJ,LJ))                                       TRIP      77
      ELJ  =  YD(J) + YD(K) +1.0                                         TRIP      78
      IF ( ELJ .GT. ENJ )      TEMP = TEMP1                              TRIP      79
      IF ( ELJ .GT. ENJ )      GO TO 1                                   TRIP      80
      LJ  =  ELJ + 1.0                                                   TRIP      81
      TEMP    =  R1 (NORDER(NJ,LJ)) * OSA + TEMP1                        TRIP      82
    1 IF ( AD(J) .NE. 1 )      TEMP = TEMP * AD(J)                       TRIP      83
      CDD(J)  =  TEMP                                                    TRIP      84
    2 CONTINUE                                                           TRIP      85
      IF (K.NE.1) GO TO 7                                                TRIP      86
      CDWD(IACC+K)  =  CDW(K) / CDD(K)                                   TRIP      87
      GO TO 6                                                            TRIP      88
    7 NDBB = K - 1                                                       TRIP      89
      COB = DCMPLF(ARG1,ARG2)                                            TRIP      90
      COBB  =  COMSCA ( CDD,CDWD(IACC+1),COB,NDBB,1,1)                   TRIP      91
      CDWD(IACC+K)  =  (CDW(K) - COBB) / CDD(K)                          TRIP      92
    6 CONTINUE                                                           TRIP      93
      IACC  =  IACC + NDB                                                TRIP      94
      IF ( IACC .EQ. 350 .OR. IACC+NDB .GT. 350 )      IACC = 0          TRIP      95
      IF ( IACC .EQ. 0 )       CALL CNRW (MTAP2,CDWD,350)                TRIP      96
    4 CONTINUE                                                           TRIP      97
      IF ( IACC .NE. 0 )       CALL CNRW (MTAP2,CDWD,350)                TRIP      98
      REWIND MTAP2                                                       TRIP      99
  100 IAC  =  0                                                          TRIP     100
      DO 11 I = 1,NWB                                                    TRIP     101
      DO 12  J = 1,I                                                     TRIP     102
   12 CINF(IAC+J)  =  0.0                                                TRIP     103
C                                                                        TRIP     104
C     INFLUENCE COEFFICIENTS FOR WING ON WING                            TRIP     105
C                                                                        TRIP     106
      DO 13 J = 1,I                                                      TRIP     107
      ENJ = XW(I) - XW(J)                                                TRIP     108
      IF ( ENJ .LT. 0.0 )      GO TO 13                                  TRIP     109
      ELJ = ABS (YW(I) - YW(J))                                          TRIP     110
      IF (ELJ.GT.ENJ) GO TO 13                                           TRIP     111
      NJ = ENJ + 1.0                                                     TRIP     112
      LJ = ELJ + 1.0                                                     TRIP     113
      TEMP1  =  R1 (NORDER(NJ,LJ))                                       TRIP     114
      ELJ = YW(I) + YW(J) + 1.0                                          TRIP     115
```

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      IF ( ELJ .GT. ENJ )      TEMP = TEMP1                              TRIP     116
      IF (ELJ.GT.ENJ) GO TO 14                                           TRIP     117
      LJ = ELJ + 1.0                                                     TRIP     118
      TEMP   =  R1 (NORDER(NJ,LJ)) * OSA + TEMP1                         TRIP     119
   14 IF ( AW(J) .NE. 1.0 )         TEMP = TEMP * AW(J)                  TRIP     120
      CINF(IAC+J)  =  TEMP                                               TRIP     121
   13 CONTINUE                                                           TRIP     122
      IF ( NDB .EQ. 0 )        GO TO 24                                  TRIP     123
C                                                                        TRIP     124
C     INFLUENCE COEFFICIENTS FOR WING DUE DIAPHRAGM                      TRIP     125
C                                                                        TRIP     126
      DO 16 II = 1,NDB                                                   TRIP     127
      CWD(II) = CMPLX(0.0,0.0)                                           TRIP     128
      ENJ = XW(I) - XD(II)                                               TRIP     129
      IF ( ENJ .LT. 0.0 )      GO TO 16                                  TRIP     130
      ELJ = ABS (YW(I) - YD(II))                                         TRIP     131
      IF (ELJ.GT.ENJ) GO TO 16                                           TRIP     132
      NJ = ENJ + 1.0                                                     TRIP     133
      LJ = ELJ + 1.0                                                     TRIP     134
      TEMP1  =  R1 (NORDER(NJ,LJ))                                       TRIP     135
      ELJ = ABS (YW(I) + YD(II) + 1.0)                                   TRIP     136
      IF ( ELJ .GT. ENJ )      TEMP = TEMP1                              TRIP     137
      IF ( ELJ .GT. ENJ )      GO TO 28                                  TRIP     138
      LJ = ELJ + 1.0                                                     TRIP     139
      TEMP=R1(NORDER(NJ,LJ))*OSA + TEMP1                                 TRIP     140
   28 IF ( AD(II) .NE. 1.0 )        TEMP = TEMP * AD(II)                 TRIP     141
      CWD(II)  =  TEMP                                                   TRIP     142
   16 CONTINUE                                                           TRIP     143
      REWIND MTAP2                                                       TRIP     144
      IACC  =  0                                                         TRIP     145
      DO 22  K = 1,I                                                     TRIP     146
      IF ( IACC .EQ. 0 )       CALL CNRW (-MTAP2,CDWD,350)               TRIP     147
      COB = DCMPLF(ARG1,ARG2)                                            TRIP     148
      COBB  =  COMSCA (CWD,CDWD(IACC+1),COB,NDB,1,1)                     TRIP     149
      CINF(IAC+K)  =  CINF(IAC+K) - COBB                                 TRIP     150
      IACC  =  IACC + NDB                                                TRIP     151
      IF ( IACC .EQ. 350 .OR. IACC+NDB .GT. 350 )      IACC = 0          TRIP     152
   22 CONTINUE                                                           TRIP     153
   24 IF ( LINC .EQ. 0 )       GO TO 25                                  TRIP     154
      LINE  =  LINE + 10 + I/10                                          TRIP     155
      IF (LINE.LE.45) GO TO 17                                           TRIP     156
      LINE  =  10 + I/10                                                 TRIP     157
      WRITE (ITAPEW,101)                                                 TRIP     158
   17 WRITE (ITAPEW,102) I                                               TRIP     159
      I1  =  IAC + 1                                                     TRIP     160
      I2  =  IAC + I                                                     TRIP     161
      WRITE (ITAPEW,103)   (CINF(II) , II=I1,I2)                         TRIP     162
C     -------  WRITE AIF ON UNITS 11 AND 14  ----------------            TRIP     163
   25 IAC  =  IAC + I                                                    TRIP     164
      IF ( IAC .EQ. 350 .OR. IAC+I+1 .GT. 350 )       IAC = 0            TRIP     165
      IF ( IAC .NE. 0 )        GO TO 11                                  TRIP     166
      CALL CNRW ( MTAP11, CINF, 350)                                     TRIP     167
      CALL CNRW ( MTAP14,CINF,350)                                       TRIP     168
   11 CONTINUE                                                           TRIP     169
      IF ( IAC .EQ. 0 )        GO TO 400                                 TRIP     170
      CALL CNRW ( MTAP11, CINF, 350)                                     TRIP     171
      CALL CNRW ( MTAP14, CINF, 350)                                     TRIP     172
```

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  400 IF ( KDWSH .EQ. 0 .OR. NDB .EQ. 0 )    GO TO 300                  TRIP  173
      REWIND MTAP8                                                      TRIP  174
      DO 31  J = 1,NDB                                                  TRIP  175
      REWIND MTAP2                                                      TRIP  176
      IACC  =  0                                                        TRIP  177
      DO 32  I = 1,NWB                                                  TRIP  178
      IF ( IACC .EQ. 0 )       CALL CNRW (-MTAP2,CDD,350)               TRIP  179
      CDWD(I)  =  CDD(J+IACC)                                           TRIP  180
      IACC  =  IACC + NDB                                               TRIP  181
      IF ( IACC .EQ. 350 .OR. IACC+NDB .GT. 350 )      IACC = 0         TRIP  182
   32 CONTINUE                                                          TRIP  183
   31 CALL CNRW (MTAP8,CDWD,NWB)                                        TRIP  184
      REWIND MTAP2                                                      TRIP  185
      REWIND MTAP8                                                      TRIP  186
      GO TO 300                                                         TRIP  187
  200 KOUNT  =  0                                                       TRIP  188
      KTOL  =  0                                                        TRIP  189
      DO 26  I = 1,NWB                                                  TRIP  190
      KTOL  =  KTOL + I                                                 TRIP  191
      IF ( KTOL .EQ. 350 .OR. KTOL+I+1 .GT. 350 )      KTOL = 0         TRIP  192
      IF ( KTOL .EQ. 0 )            KOUNT = KOUNT + 1                   TRIP  193
   26 CONTINUE                                                          TRIP  194
      IF ( KTOL .NE. 0 )            KOUNT = KOUNT + 1                   TRIP  195
      REWIND MTAP14                                                     TRIP  196
      DO 27  I = 1,KOUNT                                                TRIP  197
      CALL CNRW (-MTAP11, CINF, 350)                                    TRIP  198
   27 CALL CNRW ( MTAP14, CINF, 350)                                    TRIP  199
  300 REWIND MTAP12                                                     TRIP  200
      DO 18 I = 1,NQ                                                    TRIP  201
      REWIND MTAP14                                                     TRIP  202
      CALL CNRW (-MTAP9, DWSH, NWB)                                     TRIP  203
      DO 19 J = 1,NWB                                                   TRIP  204
      XI = (REAL(DWSH(J))*P) / ES                                       TRIP  205
      ZI = AIMAG(DWSH(J))                                               TRIP  206
   19 DWSH(J) = CMPLX (ZI,XI) * 4.0                                     TRIP  207
      IAC  =  0                                                         TRIP  208
      DO 20 K = 1,NWB                                                   TRIP  209
      IF ( IAC .EQ. 0 )       CALL CNRW (-MTAP14, CINF, 350)            TRIP  210
      COB = DCMPLF(ARG1,ARG2)                                           TRIP  211
      PP(K)  =  COMSCA (CINF(IAC+1),DWSH,COB,K,1,1)                     TRIP  212
      IAC  =  IAC + K                                                   TRIP  213
      IF ( IAC .EQ. 350 .OR. IAC+K+1 .GT. 350 )       IAC = 0           TRIP  214
   20 CONTINUE                                                          TRIP  215
      IF ( KDWSH .EQ. 0 .OR. LSVT .NE. 0 .OR. NDB .EQ. 0 )  GO TO 18    TRIP  216
      REWIND MTAP8                                                      TRIP  217
      DO 33  J = 1,NDB                                                  TRIP  218
      CALL CNRW (-MTAP8,CDD,NWB)                                        TRIP  219
      COB=DCMPLF(ARG1,ARG2)                                             TRIP  220
      CWD(J)  =  COMSCA (CDD,DWSH,COB,NWB,1,1)                          TRIP  221
   33 CWD(J)  =  CWD(J) * 0.25                                          TRIP  222
      CALL CNRW (MTAP2,CWD,NDB)                                         TRIP  223
   18 CALL CNRW (MTAP12, PP, NWB)                                       TRIP  224
      REWIND MTAP14                                                     TRIP  225
      IF ( KDWSH .EQ. 0 .OR. LSVT .NE. 0 .OR. NDB .EQ. 0 )  GO TO 50    TRIP  226
      REWIND MTAP2                                                      TRIP  227
      REWIND MTAP8                                                      TRIP  228
C                                                                       TRIP  229
```

```
                C     FORMATS                                                       TRIP       230
    230         C                                                                   TRIP       231
                  101 FORMAT (1H1, /15X34HAERODYNAMIC INFLUENCE COEFFICIENTS, 20X   TRIP       232
                     1         12H(BY COLUMNS),  //)                                TRIP       233
                  102 FORMAT (// 20X 7HROW NO , I5  //)                             TRIP       234
                  103 FORMAT (5X,10E12.4)                                           TRIP       235
    ?35         C                                                                   TRIP       236
                C                                                                   TRIP       237
                   50 RETURN                                                        TRIP       238
                      END                                                           TRIP       239


          SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS    DEF LINE     REFERENCES
    3  TRIP          1          237

VARIABLES     SN  TYPE          RELOCATION
 1310  AD         REAL      ARRAY    TOMB       REFS        18      2*82     2*140
 1203  ARG1       REAL                          REFS        89       147       210       219   DEFINED        30
 1204  ARG2       REAL                          REFS        89       147       210       219   DEFINED        31
 3424  AW         REAL      ARRAY    TOMB       REFS        18      2*61     2*119
 6610  CDD        COMPLEX   ARRAY               REFS         7        86        90        91       178       179       218
                                                 220   DEFINED        69        83
 2524  CDW        COMPLEX   ARRAY               REFS         7        21        86        91   DEFINED        48        62
 1230  CDWD       COMPLEX   ARRAY               REFS         6        21        90        95        97       146       148
                                                 183   DEFINED        86        91       179
 5314  CINF       COMPLEX   ARRAY               REFS         6       149       161       166       167       170       171
                                                 197       198       209       211   DEFINED       102       120       149
 1172  COB        COMPLEX                       REFS        14        90       148       211       220
                                             DEFINED        89       147       210       219
 1164  COBB       COMPLEX                       REFS         6        91       149   DEFINED        90       148
 4020  CWD        COMPLEX   ARRAY               REFS         6       148       221       222   DEFINED       127       141
                                                 220       221
 2524  DWSH       COMPLEX   ARRAY               REFS         7        21       202       204       205       211       220
                                             DEFINED       206
 1212  ELJ        REAL                          REFS        52        54        57        58        59        73        75
                                                  78        79        80       110       112       115       116       117
                                                 131       133       136       137       138   DEFINED        51        56
                                                  72        77       109       114       130       135
 1211  ENJ        REAL                          REFS        50        52        53        57        58        71        73
                                                  74        78        79       108       110       111       115       116
                                                 129       131       132       136       137   DEFINED        49        70
                                                 107       128
    0  ES         REAL               F.P.       REFS       204   DEFINED         1
 1207  I          INTEGER                       REFS        49        51        56      2*61       101       106       107
                                                 109       114       128       130       135       145       154       156
                                                 158       160       163       164       179       190       191
                                             DEFINED        43       100       177       189       196       200
 1220  IAC        INTEGER                       REFS       102       120     2*149       159       160       163     2*164
                                                 165       169       209       211       212     2*213
                                             DEFINED        99       163       164       207       212       213
 1206  IACC       INTEGER                       REFS        86        90        91        93      2*94        95        97
                                                 146       148       150     2*151       178       179       180     2*181
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VARIABLES       SN  TYPE           RELOCATION
                                              DEFINED      38       93       94      144      150      151      176
                                                180       181
 1221  II          INTEGER                      REFS       127      128      130      135    2*140      141      161
                                              DEFINED      126      161
 2666  IND         INTEGER   ARRAY   TOMB       REFS        18
    0  ITAPES      INTEGER   ARRAY   CTAPES     REFS        16       20       22       23       24       25       26
                                                 27        28
 1202  ITAPEW      INTEGER                    DEFINED      28    I/O REFS     36      157      158      161
 1222  I1          INTEGER                      REFS       161   DEFINED     159
 1223  I2          INTEGER                      REFS       161   DEFINED     160
 1216  J           INTEGER                      REFS        69       70       72       77     2*82       83      102
                                                107       109      114    2*119      120      179      204      205
                                                206       220    2*221  DEFINED       68      101      106      174
                                                203       217
 1210  JJ          INTEGER                      REFS        48       49       51       56       62
                                              DEFINED      47
 1215  K           INTEGER                      REFS        68       70       72       77       85     3*86       88
                                               3*91     2*149    2*211      212      213  DEFINED       64      145
                                                208
    0  KDWSH       INTEGER           F.P.       REFS       172      215      225  DEFINED        1
 1224  KOUNT       INTEGER                      REFS       192      194      196  DEFINED      187      192      194
 1225  KTOL        INTEGER                      REFS       190    2*191      192      194  DEFINED      188      190
                                                191
    0  LINC        INTEGER           F.P.       REFS        36      153  DEFINED        1
 1205  LINE        INTEGER                      REFS       154      155  DEFINED       35      154      156
 1214  LJ          INTEGER                      REFS        55       60       76       81      113      118      134
                                                139   DEFINED       54       59       75       80      112      117
                                                133       138
 1275  LS          INTEGER   ARRAY   TOMB       REFS        18
    0  LSVT        INTEGER           F.P.       REFS        32      215      225  DEFINED        1
 1177  MTAP11      INTEGER                      REFS       166      170      197  DEFINED       25
 1200  MTAP12      INTEGER                      REFS       223   DEFINED      26  I/O REFS     199
 1201  MTAP14      INTEGER                      REFS       167      171      198      209  DEFINED       27
                                             I/O REFS      29      195      201      224
 1174  MTAP2       INTEGER                      REFS        95       97      146      178      222
                                              DEFINED      22   I/O REFS      33       98      143      175      184
                                                226
 1175  MTAP8       INTEGER                      REFS       183      218  DEFINED       23  I/O REFS     173      185
                                                216       227
 1176  MTAP9       INTEGER                      REFS       202   DEFINED      24
 1274  NDB         INTEGER           TOMB       REFS        18       33       37       47       64       93       94
                                                122       126      148      150      151      172      174      180
                                                181       215      217      222      225
 1217  NDBB        INTEGER                      REFS        90   DEFINED      88
 1213  NJ          INTEGER                      REFS        55       60       76       81      113      118      134
                                                139   DEFINED       53       74      111      132
    0  NKF         INTEGER  *UNUSED  F.P.     DEFINED       1
    0  NQ          INTEGER           F.P.       REFS       200   DEFINED       1
 1307  NWB         INTEGER           TOMB       REFS        18       43      100      177      183      189      202
                                                203       208      218      220      223
    0  OSA         REAL              F.P.       REFS        60       81      118      139  DEFINED        1
    0  P           REAL              F.P.       REFS       204   DEFINED       1
 1230  PP          COMPLEX   ARRAY              REFS         7       21      223  DEFINED      211
    0  R1          COMPLEX   ARRAY   CORPSE     REFS         7       17       55       60       76       81      113
                                                118       134      139
 1166  TEMP        COMPLEX                      REFS         8       61       62       82       83      119      120
                                                140       141  DEFINED       57       60       61       78       81
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VARIABLES      SN  TYPE           RELOCATION
                                                  82      115      118      119      136      139      140
 1170  TEMP1      COMPLEX                       REFS        8       57       60       78       81      115      118
                                                 136      139  DEFINED       55       76      113      134
    0  VBO        REAL      *UNUSED   F.P.   DEFINED        1
 1702  XD         REAL       ARRAY    TOMB      REFS       18       49     2*70      128
 1226  XI         REAL                          REFS      206  DEFINED      204
 1302  XMAX       REAL       ARRAY    TOMB      REFS       18
    0  XW         REAL       ARRAY    TOMB      REFS       18       49    2*107      128
 2274  YD         REAL       ARRAY    TOMB      REFS       18       51       56     2*72     2*77      130      135
  536  YW         REAL       ARRAY    TOMB      REFS       18       51       56    2*109    2*114      130      135
 1227  ZI         REAL                          REFS      206  DEFINED      205
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       CNRW                  3              95       97      146      166      167      170      171      178      183
                                           197      198      202      209      218      222      223
       COMSCA     COMPLEX    6               6       90      148      211      220
       DCMPLF     COMPLEX    2              14       89      147      210      219
       NORDER     INTEGER    2              55       60       76       81      113      118      134      139

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       ABS        REAL       1  INTRIN              51       72      109      130      135
       AIMAG      REAL       1  INTRIN             205
       CMPLX      COMPLEX    2  INTRIN              48       69      127      206
       REAL       REAL       1  INTRIN             204

STATEMENT LABELS           DEF LINE   REFERENCES
  167  1                       82        79
  200  2                       84        68       71       73
    0  4                       96        43
  241  6                       92        64       87
  215  7                       88        85
  115  9                       63        47       50       52
  536  11                     168       100      165
    0  12                     102       101
  353  13                     121       106      108      110
  341  14                     119       116
  440  16                     142       126      129      131
  510  17                     158       155
  745  18                     223       200      215
    0  19                     206       203
    0  20                     214       208
    0  22                     152       145
  477  24                     153       122
  523  25                     163       153
    0  26                     193       189
    0  27                     198       196
  427  28                     140       137
  104  30                      61        58
    0  31                     183       174
    0  32                     182       177
    0  33                     221       217
  764  50                     237       225
  263  100                     99        37
 1141  101     FMT            231        36      157
 1151  102     FMT            233       158
 1154  103     FMT            234       161
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STATEMENT LABELS              DEF LINE   REFERENCES
  611  200                        187          32
  645  300                        199         172         186
  545  400                        172         169

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   36  4        I            43 96       221B               EXT REFS  NOT INNER
   37  5        JJ           47 63        61B               EXT REFS
  121  6        K            64 92       123B               EXT REFS  NOT INNER
  122  2        J            68 84        61B               EXT REFS
  265  11       I           100 168      254B               EXT REFS  NOT INNER
  272  12       J           101 102        2B     INSTACK
  276  13       J           106 121       60B               EXT REFS
  360  16       II          126 142       63B               EXT REFS
  446  22       K           145 152       31B               EXT REFS
  554  31       J           174 183       31B               EXT REFS  NOT INNER
  560  32       I           177 182       21B               EXT REFS
  616  26       I           189 193       11B        OPT
  635  27       I           196 198       10B               EXT REFS
  650  18       I           200 223      102B               EXT REFS  NOT INNER
  661  19       J           203 206        6B     INSTACK
  672  20       K           208 214       25B               EXT REFS
  726  33       J           217 221       15B               EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES        50                0 ITAPES (50)
       CORPSE      4000                0 R1      (4000)
       TOMB        2162                0 XW      (350)           350 YW      (350)          700 NDB     (1)
                                     701 LS      (5)             706 XMAX    (5)            711 NWB     (1)
                                     712 AD      (250)           962 XD      (250)         1212 YD      (250)
                                    1462 IND     (350)          1812 AW      (350)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       PP           700                0 CDWD    (700)
       DWSH         700                0 CDW     (700)

STATISTICS
  PROGRAM LENGTH               10117B     4175
  CM LABELED COMMON LENGTH     14104B     6212
          52000B CM USED
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
 1730  46       FMT              281        205
    0  47                        207        206
 1737  48       FMT              282        207
  222  49                        103        101
 1742  51       FMT              283        212
  664  52                        222        217
 1750  53       FMT              284        218
 1756  54       FMT              285        222
  705  55                        232        227
 1764  56       FMT              286        228
    0  57                        125        115
 1772  58       FMT              287        232
 2000  59       FMT              288        238
  307  60                        124        116        117
    0  75                        211        210
  403  108                       154        144        150
  420  109                       162        141        158
 2006  110      FMT              289        174        178
  726  200                       242        104        237

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   33  3        I          58 59          3B     INSTACK
   44  4        I          60 63          4B     INSTACK
   52  5        J          64 70         32B              EXT REFS  NOT INNER
   63  6        I          66 69         16B        OPT
  112  7        I          71 81         22B        OPT
  151  18       I          86 92         23B              EXT REFS
  201  30       I          95 96          4B     INSTACK
  224  200      K         104 242       505B              EXT REFS  NOT INNER
  235  10       JJ        107 109         3B     INSTACK
  242  19       I         111 114        16B              NOT INNER
  251  19       J         112 114         3B     INSTACK
  261  57       KL        115 125        33B              NOT INNER
  273  60       I         116 124        16B        OPT
  316  21       I         127 140        33B              NOT INNER
  323  22       J         129 131        11B        OPT     EXITS
  352  109      IX        141 162        51B              NOT INNER
  366  108      IXL       144 154        21B        OPT
  426  26       II        165 173        44B              EXT REFS  NOT INNER
  445  26       JJ        169 173        23B              EXT REFS
  523  38       I         188 189        13B              EXT REFS
  537  42       I         191 196        25B              EXT REFS
  566  45       I         198 202        24B              EXT REFS
  620  47       I         206 207        12B              EXT REFS
  640  75       I         210 211         2B     INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       TOMB       2162            0 XW     (350)        350 YW     (350)        700 NDB    (1)
                                701 LS     (5)          706 XMAX   (5)          711 NWB    (1)
                                712 AD     (250)        962 XD     (250)       1212 YD     (250)
                               1462 IND    (350)       1812 AW     (350)
       IDIOT       411            0 CLEXR  (100)        100 CLEYR  (100)        200 CTEXR  (100)
                                300 CTEYR  (100)        400 NCLER  (5)          405 NCTER  (5)
                                410 NS     (1)
       KIMA         10            0 LZ     (5)            5 IINC   (5)
       CTAPES       50            0 ITAPES (50)
       COMA         41            0 LC     (40)          40 BR     (1)
```

```
VARIABLES     SN  TYPE            RELOCATION
                                               202        207       208       215       220       225       230       235
                                               240     DEFINED      128
      VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS         REFERENCES
      CNRW                   3              65       105
      FATAN      REAL        2             193       200
      PICTUR                14             175       179       215       220       225       230       235       240
      SQRT       REAL        1 LIBRARY     192       199

INLINE FUNCTIONS    TYPE    ARGS          DEF LINE  REFERENCES
      AIMAG      REAL        1  INTRIN               2*77      2*78       151
      AMAX1      REAL        0  INTRIN                 96
      CMPLX      COMPLEX     2  INTRIN                 61        62        63        80        81       114
      FLOAT      REAL        1  INTRIN                 98       100
      REAL       REAL        1  INTRIN               2*72      2*73        88        89        90       146

STATEMENT LABELS              DEF LINE   REFERENCES
    0  3                          59         58
    0  4                          63         60
    0  5                          70         64
    0  6                          69         66
    0  7                          81         71
  124  8                          79         76
 1457  9        FMT              247         82
    0  10                        109        107
 1470  11       FMT              249         83
 1475  12       FMT              250         84
 1522  13       FMT              254         85
 1533  16       FMT              256         87
 1545  17       FMT              258         91
    0  18                         92         86
    0  19                        114        111       112
    0  21                        140        127
    0  22                        131        129
  334  23                        133        130
  503  25                        181        177
    0  26                        173        165       169
 1552  27       FMT              259        166
 1603  28       FMT              263        167
 1630  29       FMT              267        171
    0  30                         96         95
 1634  31       FMT              268        172
 1637  32       FMT              269        182       203
 1651  33       FMT              271        183       204       213       219       223       229       233       239
 1660  34       FMT              273        184       214       224       234
 1666  35       FMT              274        185
 1701  36       FMT              276        186
  536  37                        191        187
    0  38                        189        188
 1707  39       FMT              277        189
  212  40                         99        102
  632  41                        208        190
    0  42                        196        191
 1712  43       FMT              278        196       202
 1715  44       FMT              279        197
    0  45                        202        198
```

```
VARIABLES     SN  TYPE            RELOCATION
   632 NS         INTEGER               IDIOT     REFS       22
  2055 NSTA       INTEGER                         REFS       99      2*100    2*101      103      115      127      141
                                                   165      188        191      198      206      208      209      215
                                                   220      226        230      235      240  DEFINED       97       99
                                                   103
  2076 NSYM       INTEGER      ARRAY              REFS        5        123      175      179  DEFINED      108      123
  1307 NWB        INTEGER               TOMB      REFS       21         58       65       66       95      105      116
  3466 PI         REAL         ARRAY              REFS        7        152      153      171      179
                                               DEFINED      151
 11402 PP         COMPLEX      ARRAY              REFS       27         65       67       68       69      105      122
 12676 PPP        COMPLEX      ARRAY              REFS       27        146      151  DEFINED      114      122
  2730 PR         REAL         ARRAY              REFS        7        147      149      171      172      175
                                               DEFINED      146
  2051 RECL       REAL                            REFS       91    DEFINED       88
  2052 REXP       REAL                            REFS       91    DEFINED       89
  2053 REYP       REAL                            REFS       91    DEFINED       90
  2073 RTD        REAL                            REFS      195        201  DEFINED      194
  2057 SMAX       REAL                            REFS      175        179  DEFINED      106
  2031 SS         LOGICAL                         REFS       31         76       83       84       85       87       91
                                                   150      158        166      167      171      172      177      183
                                                   184      185        186      187      213      214      217      223
                                                   224      227        233      234      237  DEFINED       49       50
  2042 SURF       REAL                            REFS       59         79  DEFINED       57       59
  2034 TOL      * REAL                         DEFINED       48
     0 VBO        REAL                  F.P.      REFS       83        166      183      204      213      219      223
                                                   229      233        239  DEFINED        1
  2172 X          REAL         ARRAY              REFS        6        149      153      171      172      175      179
                                               DEFINED      148
  2047 XCI        REAL                            REFS       80    DEFINED       74       77
 16736 XCP        COMPLEX      ARRAY              REFS       28         68       72       77       87       89
                                               DEFINED       62         68       80
  2045 XCR        REAL                            REFS       80    DEFINED       72
  1702 XD         REAL         ARRAY    TOMB      REFS        9         21
  2040 XEL        REAL                            REFS       56         73       78      128  DEFINED       55
  2037 XES        REAL                            REFS       55         56       72       77      106      120
                                               DEFINED       54
 10726 XLE        REAL         ARRAY              REFS       11        149      153  DEFINED      133
  1302 XMAX       REAL         ARRAY    TOMB      REFS        8         21      106
 11202 XNAME1     REAL         ARRAY              REFS       14        175  DEFINED       33
 11216 XNAME2     REAL         ARRAY              REFS       14        179  DEFINED       34
     0 XW         REAL         ARRAY    TOMB      REFS        6         21       68      120
  4762 XX         REAL         ARRAY              REFS        8        148  DEFINED      113      120
  2050 YCI        REAL                            REFS       81    DEFINED       75       78
 17056 YCP        COMPLEX      ARRAY              REFS       28         69       73       78       87       90
                                               DEFINED       63         69       81
  2046 YCR        REAL                            REFS       81    DEFINED       73
  2274 YD         REAL         ARRAY    TOMB      REFS        9         21
  2075 YMAX       REAL                            REFS      215        220      225      230      235      240
                                               DEFINED      208
  2054 YMX        REAL                            REFS       96        101  DEFINED       94       96
 11166 YNAME      REAL         ARRAY              REFS       14        175      179  DEFINED       32
 11232 YNAME2     REAL         ARRAY              REFS       15        215      220      225      230      235      240
                                               DEFINED       35
 11356 YS         REAL         ARRAY              REFS       19        100    2*101      117      128
                                               DEFINED       98        100
   536 YW         REAL         ARRAY    TOMB      REFS        6         21       69       96      117
  2146 YY         REAL         ARRAY              REFS        5      2*130      133      166      167      189      196
```

```
VARIABLES     SN  TYPE          RELOCATION
                                          2*72     2*73     2*77     2*78     2*79       80       81     4*87
                                            88       89       90       91       96      113      114      117
                                           120      121      122    2*128    2*130    2*133      137      138
                                           139      140      175      179    4*189    2*192    2*193    3*196
                                         2*199    2*200    3*202    3*207      211  DEFINED       58       60
                                            66       71       86       95      111      116      127      163
                                           188      191      198      206      210
 4224  IAUX       INTEGER   ARRAY         REFS        7      175      179      215      220      225      230
                                           235      240
 2070  II         INTEGER                 REFS      166      167      168  DEFINED      165
    5  IINC       INTEGER   ARRAY   KIMA  REFS       23       52
 2036  INC        INTEGER                 REFS      100  DEFINED       52
 2666  IND        INTEGER   ARRAY   TOMB  REFS       10       21
 2062  IP         INTEGER                 REFS      120      121      122  DEFINED      119
    0  ITAPES     INTEGER   ARRAY  CTAPES REFS       18       24       44       45       46
 2032  ITAPEW     INTEGER              DEFINED       44 I/O REFS       82       83       84       85       87
                                            91      166      167      171      172      174      178      182
                                           183      184      185      186      189      196      197      202
                                           203      204      205      207      212      213      214      218
                                           219      222      223      224      228      229      232      233
                                           234      238      239
 2065  IX         INTEGER                 REFS      142      143      146    3*147      148    4*149      151
                                         3*152    4*153    3*154    3*155    3*156    3*157    3*159    3*160
                                         3*161  DEFINED      141
 2067  IXL        INTEGER                 REFS      146      147      148      149      151      152      153
                                           154  DEFINED      144
 2044  J          INTEGER                 REFS     2*67     2*68     2*69      113      114    2*130    6*133
                                       DEFINED       64      112      129
 2060  JJ         INTEGER                 REFS      108      109  DEFINED      107      169
 2056  K          INTEGER                 REFS      166      167      174      178      182      203      212
                                           218      222      228      232      238  DEFINED      104
    0  KIX        INTEGER           F.P.  REFS       51       52       82       98      106    2*130    6*133
                                           166      167      183      184      204      213      214      219
                                           223      224      229      233      234      239
                                       DEFINED        1
 2061  KL         INTEGER                 REFS      117    2*118      119      120      121      122    2*123
                                       DEFINED      115
 2035  L        * INTEGER              DEFINED       51
    0  LC         INTEGER   ARRAY   COMA  REFS       25       50
    ?  LL         INTEGER   ARRAY         REFS        5      118      119      143      168
                                       DEFINED      109      118
 1275  LS         INTEGER   ARRAY   TOMB  REFS        8       21
    0  LZ         INTEGER   ARRAY   KIMA  REFS       23       51       98
 6732  MSYM       INTEGER   ARRAY         REFS       10      215      220      225      230      235      240
                                       DEFINED      209      211
 2033  MTAP12     INTEGER                 REFS       65      105  DEFINED       45       46
                                      I/O REFS       53       93
 2063  N          INTEGER                 REFS      145      146      147      148    2*149      151      152
                                         2*153      163      170    3*171    2*172  DEFINED      126      145
                                           164      170
 2064  NCLE     * INTEGER  *UNDEF         REFS      129
  620  NCLER      INTEGER   ARRAY  IDIOT  REFS        3       22
  625  NCTER      INTEGER   ARRAY  IDIOT  REFS        3       22
 1274  NDB        INTEGER           TOMB  REFS       21
 2066  NIX        INTEGER                 REFS      144      169  DEFINED      143      168
    0  NQ         INTEGER           F.P.  REFS       60       64       71       86      104
                                       DEFINED        1
```

```
                 56 FORMAT (1H1,6X7HMODE = ,I3,10X15HCM-IMAG VS. ETA, //)               IMAGE     287
                 58 FORMAT (1H1,6X7HMODE = ,I3,10X15HCP-REAL VS. ETA, //)               IMAGE     288
                 59 FORMAT (1H1,6X7HMODE = ,I3,10X15HCP-IMAG VS. ETA, //)               IMAGE     289
                110 FORMAT(1H1,23H PRESSURE PLOT FOR MODEI3/)                            IMAGE     290
  290        C                                                                           IMAGE     291
                    RETURN                                                               IMAGE     292
                    END                                                                  IMAGE     293
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  IMAGE          1         291

VARIABLES     SN  TYPE            RELOCATION
 6756  AB         REAL       ARRAY                REFS       11      147      149      152      153      154
                                               DEFINED      121
11142  AC         REAL       ARRAY                REFS       13      154      156      160  DEFINED      142      154
 1310  AD         REAL       ARRAY      TOMB      REFS        9       21
    0  AM         REAL                  F.P.      REFS       82      166      167      183      184      204      213
                                                   214      219      223      224      229      233      234      239
                                               DEFINED        1
 2041  ARBX     * REAL                         DEFINED       56
 3424  AW         REAL       ARRAY      TOMB      REFS       10       21       59       67       68       69      121
   50  BR         REAL                  COMA      REFS       25
 2071  CLAM       REAL                            REFS      196      202  DEFINED      192      199
 2074  CLDG       REAL                            REFS      196      202  DEFINED      195      201
    0  CLEXR      REAL       ARRAY      IDIOT     REFS        3       22    3*133
  144  CLEYR      REAL       ARRAY      IDIOT     REFS        4       22    2*130    3*133
10776  CLI        REAL       ARRAY                REFS       12      152      159      160      192      193      196
                                                   220  DEFINED      138      152      160
11262  CLIN       REAL       ARRAY                REFS       15      220  DEFINED       37
10752  CLR        REAL       ARRAY                REFS       11      147      155      156      157      189      192
                                                   193      196      215  DEFINED      137      147      156
 2072  CLRD       REAL                            REFS      195      196      201      202  DEFINED      193      200
11246  CLRN       REAL       ARRAY                REFS       15      215  DEFINED       36
16616  CLT        COMPLEX    ARRAY                REFS       28       67       72       73       77       78       79
                                                    87       88  DEFINED       61       67       79
11046  CMI        REAL       ARRAY                REFS       12      153      159      161      199      200      202
                                                   230  DEFINED      140      153      161
11312  CMIN       REAL       ARRAY                REFS       16      230  DEFINED       39
11022  CMR        REAL       ARRAY                REFS       12      149      155      189      199      200      202
                                                   225  DEFINED      139      149      157
11276  CMRN       REAL       ARRAY                REFS       16      225  DEFINED       38
11116  CPI        REAL       ARRAY                REFS       13      207      240  DEFINED      159
11342  CPIN       REAL       ARRAY                REFS       17      240  DEFINED       41
11072  CPR        REAL       ARRAY                REFS       13      157      161      189      207      235
                                               DEFINED      155
11326  CPRN       REAL       ARRAY                REFS       16      235  DEFINED       40
  310  CTEXR      REAL       ARRAY      IDIOT     REFS        4       22
  454  CTEYR      REAL       ARRAY      IDIOT     REFS        4       22
    0  EL         REAL                  F.P.      REFS       55  DEFINED        1
    0  ES         REAL                  F.P.      REFS       54  DEFINED        1
 2043  I          INTEGER                         REFS       59       61       62       63     2*67     3*68     3*69
```

```
      WRITE (ITAPEW,33) KIX , AM , VBO
      CALL PICTUR (CMI,YY,NSTA,CMIN,YNAME2,-100.0,0.0,YMAX,50.0,1.0,2.0,
     1MSYM,1,IAUX)
   55 WRITE (ITAPEW,58) K
      IF (.NOT.SS) WRITE (ITAPEW,33) KIX , AM , VBO
      IF  (SS) WRITE (ITAPEW,34) KIX , AM
      CALL PICTUR (CPR,YY,NSTA,CPRN,YNAME2,-100.0,0.0,YMAX,50.0,1.0,2.0,
     1MSYM,1,IAUX)
      IF (SS) GO TO 200
      WRITE (ITAPEW,59) K
      WRITE (ITAPEW,33) KIX , AM , VBO
      CALL PICTUR (CPI,YY,NSTA,CPIN,YNAME2,-100.0,0.0,YMAX,50.0,1.0,2.0,
     1MSYM,1,IAUX)
  200 CONTINUE
C
C
C FORMATS
C
    9 FORMAT (1H1,/15X36HSURFACE COEFFICIENTS FOR SURFACE NO , I2,
     1         16H  AT MACH NO. = ,F5.2  //)
   11 FORMAT (15X19HREDUCED VELOCITY = , F7.3 //)
   12 FORMAT (11X4HMODE,8X16HLIFT COEFFICIENT,8X55HCENTER OF PRESSURE LO
     1CATION IN INCHES FROM FORWARD APEX, /55X9HCHORDWISE,20X,8HSPANWISE
     2, /23X18H(REAL , IMAGINARY),12X18H(REAL , IMAGINARY),
     318H(REAL , IMAGINARY), //)
   13 FORMAT (11X4HMODE,5X16HLIFT COEFFICIENT,7X18HCENTER OF PRESSURE, /
     1         42X5HX(IN),7X5HY(IN), //)
   16 FORMAT (12X,I3,5X2H( ,E10.3,2H, ,E10.3,2H ),4X2H( ,E10.3,2H, ,
     1         E10.3,2H ),3X2H( ,E10.3,2H, ,E10.3,2H ), /)
   17 FORMAT ((12X,I3,8X,E10.3,7X,E10.3,5X,E10.3)/)
   27 FORMAT (1H1,/10X50HCHORDWISE PRESSURE DISTRIBUTION FOR SURFACE NO.
     1 = ,I3,2X14HAT MACH NO. = ,F7.3,2X10HFOR VBO = ,F7.3//15X23HAT SPA
     2NWISE DISTANCE = ,F12.3,2X22HINCHES FROM CENTERLINE,//11X9HX(INCHE
     3S),21X,8HPRESSURE,/32X4HREAL,16X4HIMAG,20X7HMODE = ,I3 //)
   28 FORMAT (1H1,/10X50HCHORDWISE PRESSURE DISTRIBUTION FOR SURFACE NO.
     1 = ,I3,2X13HAT MACH NO. =,F7.3,//15X23HAT SPANWISE DISTANCE = ,
     2F12.3,2X22HINCHES FROM CENTERLINE,//11X 9HX(INCHES),
     311X8HPRESSURE,20X7HMODE = ,I3 //)
   29 FORMAT (10X,F10.3,10X,E10.3,10X,E10.3)
   31 FORMAT (10X,F10.3,10X,E10.3)
   32 FORMAT (1H1,/5X44HLIFT AND MOMENT COEFFICIENTS FOR MODE NO. = , I3
     1         //15X20HSECTION COEFFICIENTS,//)
   33 FORMAT (10X,9HSURFACE  ,I3,5X11HMACH NO. = ,F10.3,5X6HVBO = ,
     1         F10.3//)
   34 FORMAT (10X,9HSURFACE  ,I3,5X11HMACH NO. = ,F10.3//)
   35 FORMAT (5X16HSPANWISE STATION,4X8HCL(REAL),8X8HCL(IMAG),8X
     1         8HCL(AMPL),8X10HPHASE(RAD),5X10HPHASE(DEG), //)
   36 FORMAT (5X16HSPANWISE STATION,7X2HCL,14X2HCM,14X2HCP, //)
   39 FORMAT (5X,1P4E16.8)
   43 FORMAT (5X,1P6E16.8)
   44 FORMAT (//5X16HSPANWISE STATION,4X8HCM(REAL),8X8HCM(IMAG),8X
     1         8HCM(AMPL),8X10HPHASE(RAD),5X10HPHASE(DEG), //)
   46 FORMAT (//5X16HSPANWISE STATION,4X8HCP(REAL),8X8HCP(IMAG), //)
   48 FORMAT (5X,1P3E16.8)
   51 FORMAT (1H1,6X7HMODE = ,I3,10X15HCL-REAL VS. ETA, //)
   53 FORMAT (1H1,6X7HMODE = ,I3,10X15HCL-IMAG VS. ETA, //)
   54 FORMAT (1H1,6X7HMODE = ,I3,10X15HCM-REAL VS. ETA, //)
```

```
      IF (SS) WRITE (ITAPEW,31) X(N) , PR(N)                                 IMAGE    173
   26 CONTINUE                                                                IMAGE    174
      WRITE (ITAPEW,110) K                                                    IMAGE    175
      CALL PICTUR (PR,X,I,XNAME1,YNAME,-100.0,0.0,SMAX,50.0,1.0,2.0,          IMAGE    176
     1             NSYM,1,IAUX)                                               IMAGE    177
      IF (SS) GO TO 25                                                        IMAGE    178
      WRITE (ITAPEW,110) K                                                    IMAGE    179
      CALL PICTUR (PI,X,I,XNAME2,YNAME,-100.0,0.0,SMAX,50.0,1.0,2.0,          IMAGE    180
     1             NSYM,1,IAUX)                                               IMAGE    181
   25 CONTINUE                                                                IMAGE    182
      WRITE (ITAPEW,32) K                                                     IMAGE    183
      IF (.NOT.SS) WRITE (ITAPEW,33) KIX , AM , VBO                           IMAGE    184
      IF (SS) WRITE (ITAPEW,34) KIX , AM                                      IMAGE    185
      IF (.NOT.SS) WRITE (ITAPEW,35)                                          IMAGE    186
      IF (SS) WRITE (ITAPEW,36)                                               IMAGE    187
      IF (.NOT.SS) GO TO 37                                                   IMAGE    188
      DO 38 I = 1,NSTA                                                        IMAGE    189
   38 WRITE (ITAPEW,39) YY(I) , CLR(I) , CMR(I) , CPR(I)                      IMAGE    190
      GO TO 41                                                                IMAGE    191
   37 DO 42 I = 1,NSTA                                                        IMAGE    192
      CLAM = SQRT (CLR(I)**2 + CLI(I)**2)                                     IMAGE    193
      CLRD = FATAN (CLI(I),CLR(I))                                            IMAGE    194
      RTD = 180.0/3.1415927                                                   IMAGE    195
      CLDG = CLRD * RTD                                                       IMAGE    196
   42 WRITE (ITAPEW,43) YY(I) , CLR(I) , CLI(I) , CLAM , CLRD , CLDG          IMAGE    197
      WRITE (ITAPEW,44)                                                       IMAGE    198
      DO 45 I = 1,NSTA                                                        IMAGE    199
      CLAM = SQRT (CMR(I)**2 + CMI(I)**2)                                     IMAGE    200
      CLRD = FATAN (CMI(I),CMR(I))                                            IMAGE    201
      CLDG = CLRD * RTD                                                       IMAGE    202
   45 WRITE (ITAPEW,43) YY(I) , CMR(I) , CMI(I) , CLAM , CLRD , CLDG          IMAGE    203
      WRITE (ITAPEW,32) K                                                     IMAGE    204
      WRITE (ITAPEW,33) KIX , AM , VBO                                        IMAGE    205
      WRITE (ITAPEW,46)                                                       IMAGE    206
      DO 47 I = 1,NSTA                                                        IMAGE    207
   47 WRITE (ITAPEW,48) YY(I) , CPR(I) , CPI(I)                               IMAGE    208
   41 YMAX = YY(NSTA)                                                         IMAGE    209
      MSYM(1) = NSTA                                                          IMAGE    210
      DO 75 I = 2,20                                                          IMAGE    211
   75 MSYM(I) = 0                                                             IMAGE    212
      WRITE (ITAPEW,51) K                                                     IMAGE    213
      IF (.NOT.SS) WRITE (ITAPEW,33) KIX , AM , VBO                           IMAGE    214
      IF  (SS) WRITE (ITAPEW,34) KIX , AM                                     IMAGE    215
      CALL PICTUR (CLR,YY,NSTA,CLRN,YNAME2,-100.0,0.0,YMAX,50.0,1.0,2.0,      IMAGE    216
     1MSYM,1,IAUX)                                                            IMAGE    217
      IF (SS) GO TO 52                                                        IMAGE    218
      WRITE (ITAPEW,53) K                                                     IMAGE    219
      WRITE (ITAPEW,33) KIX , AM , VBO                                        IMAGE    220
      CALL PICTUR (CLI,YY,NSTA,CLIN,YNAME2,-100.0,0.0,YMAX,50.0,1.0,2.0,      IMAGE    221
     1MSYM,1,IAUX)                                                            IMAGE    222
   52 WRITE (ITAPEW,54) K                                                     IMAGE    223
      IF (.NOT.SS) WRITE (ITAPEW,33) KIX , AM , VBO                           IMAGE    224
      IF (SS) WRITE (ITAPEW,34) KIX , AM                                      IMAGE    225
      CALL PICTUR (CMR,YY,NSTA,CMRN,YNAME2,-100.0,0.0,YMAX,50.0,1.0,2.0,      IMAGE    226
     1MSYM,1,IAUX)                                                            IMAGE    227
      IF (SS) GO TO 55                                                        IMAGE    228
      WRITE (ITAPEW,56) K                                                     IMAGE    229
```

```
      DO 57  KL = 1,NSTA
      DO 60  I = 1,NWB
      IF ( YW(I) .NE. YS(KL) )     GO TO 60
      LL(KL)  =  LL(KL) + 1
      IP  =  LL(KL)
      XX(IP,KL)  =  (XW(I) + 0.5) * XES
      AB(IP,KL)=AW(I)
      PPP(IP,KL)  =  PP(I)
      NSYM(KL)  =  NSYM(KL) + 1
   60 CONTINUE
   57 CONTINUE
      N=0
      DO 21 I = 1,NSTA
      YY(I)=(YS(I)+0.5)*XEL
      DO 22 J = 2,NCLE
      IF (YY(I).GT.CLEYR(J-1,KIX).AND.YY(I).LE.CLEYR(J,KIX)) GO TO 23
   22 CONTINUE
C     ------ LEADING EDGE COORDINATE ----------------
   23 XLE(I) = CLEXR(J-1,KIX) + (YY(I)-CLEYR(J-1,KIX))*(CLEXR(J,KIX)-
     1CLEXR(J-1,KIX))/(CLEYR(J,KIX)-CLEYR(J-1,KIX))
C     ----------- INITIALIZATION ----------------
C     ------- COMPLEX LIFT AND MOMENT COEFFICIENTS -----
      CLR(I) = 0.0
      CLI(I) = 0.0
      CMR(I) = 0.0
   21 CMI(I) = 0.0
      DO 109 IX=1,NSTA
      AC(IX) = 0.0
      NIX=LL(IX)
      DO 108 IXL=1,NIX
      N=N+1
      PR(N) = REAL (PPP(IXL,IX))
      CLR(IX) = CLR(IX) + PR(N)*AB(IXL,IX)
      X(N) = XX(IXL,IX)
      CMR(IX) = CMR(IX) + PR(N)*AB(IXL,IX)*(X(N)-XLE(IX))
      IF (SS) GO TO 108
      PI(N) = AIMAG (PPP(IXL,IX))
      CLI(IX) = CLI(IX) + PI(N)*AB(IXL,IX)
      CMI(IX) = CMI(IX) + PI(N)*AB(IXL,IX)*(X(N)-XLE(IX))
  108 AC(IX) = AC(IX) + AB(IXL,IX)
      CPR(IX) = CMR(IX) / CLR(IX)
      CLR(IX) = CLR(IX) / AC(IX)
      CMR(IX) = CLR(IX) * CPR(IX)
      IF (SS) GO TO 109
      CPI(IX) = CMI(IX) / CLI(IX)
      CLI(IX) = CLI(IX) / AC(IX)
      CMI(IX) = CMI(IX) * CPR(IX)
  109 CONTINUE
      I=N
      N = 0
      DO 26 II = 1,NSTA
      IF (.NOT.SS) WRITE (ITAPEW,27) KIX , AM , VBO , YY(II) , K
      IF (SS) WRITE (ITAPEW,28) KIX , AM , YY(II) , K
      NIX = LL(II)
      DO 26 JJ = 1,NIX
      N = N + 1
      IF (.NOT.SS) WRITE (ITAPEW,29) X(N) , PR(N) , PI(N)
```

```
      DO 3 I = 1,NWB
    3 SURF = SURF + AW(I)
      DO 4 I = 1,NQ
      CLT(I) = CMPLX(0.0,0.0)
      XCP(I) = CMPLX(0.0,0.0)
    4 YCP(I) = CMPLX(0.0,0.0)
      DO 5 J = 1,NQ
      CALL CNRW (-MTAP12,PP,NWB)
      DO 6 I = 1,NWB
      CLT(J) = CLT(J) + PP(I)*AW(I)
      XCP(J)   =  XCP(J) + PP(I)*AW(I) * (XW(I) + 0.5)
    6 YCP(J)   =  YCP(J) + PP(I)*AW(I) * (YW(I) + 0.5)
    5 CONTINUE
      DO 7 I = 1,NQ
      XCR = REAL(XCP(I))*XES/(REAL(CLT(I)))
      YCR = REAL(YCP(I))*XEL/(REAL(CLT(I)))
      XCI = 0.0
      YCI = 0.0
      IF (SS) GO TO 8
      XCI = AIMAG(XCP(I))*XES/(AIMAG(CLT(I)))
      YCI = AIMAG(YCP(I))*XEL/(AIMAG(CLT(I)))
    8 CLT(I) = CLT(I) / SURF
      XCP(I) = CMPLX (XCR,XCI)
    7 YCP(I) = CMPLX (YCR,YCI)
      WRITE (ITAPEW,9) KIX , AM
      IF (.NOT.SS)WRITE (ITAPEW,11) VBO
      IF (.NOT.SS) WRITE (ITAPEW,12)
      IF (SS) WRITE (ITAPEW,13)
      DO 18 I = 1,NQ
      IF (.NOT.SS) WRITE (ITAPEW,16) I , CLT(I) , XCP(I) , YCP(I)
      RECL = REAL (CLT(I))
      REXP = REAL (XCP(I))
      REYP = REAL (YCP(I))
      IF (SS) WRITE (ITAPEW,17) I , RECL , REXP , REYP
   18 CONTINUE
      REWIND MTAP12
      YMX  =  0.0
      DO 30  I = 1,NWB
   30 YMX  =  AMAX1 (YMX , YW(I))
      NSTA  =  1
      YS(1)  =  FLOAT (LZ(KIX)-1)
   40 NSTA  =  NSTA + 1
      YS(NSTA)  = YS(NSTA-1) + FLOAT(INC)
      IF ( YS(NSTA) .GT. YMX .OR. YS(NSTA) .GT. 19.0)  GO TO 49
      GO TO 40
   49 NSTA  =  NSTA - 1
      DO 200 K = 1,NQ
      CALL CNRW (-MTAP12,PP,NWB)
      SMAX = (XMAX(KIX) + 0.5)*XES
      DO 10 JJ=1,20
      NSYM(JJ)=0
   10 LL(JJ)=0
C
      DO 19  I = 1,50
      DO 19  J = 1,20
      XX(I,J) = 0.0
   19 PPP(I,J) = CMPLX(0.0,0.0)
```

```
      SUBROUTINE IMAGE (NQ,KIX,ES,EL,VBO,AM)                              IMAGE    2
C                                                                         IMAGE    3
      DIMENSION      NCLER(5) ,     NCTER(5) ,  CLEXR(20,5)               IMAGE    4
      DIMENSION   CLEYR(20,5) ,  CTEXR(20,5) ,  CTEYR(20,5)               IMAGE    5
      DIMENSION      NSYM(20) ,        LL(20) ,       YY(20)              IMAGE    6
      DIMENSION       XW(350) ,       YW(350) ,       X(350)              IMAGE    7
      DIMENSION       PR(350) ,       PI(350) ,    IAUX(350)              IMAGE    8
      DIMENSION     XX(50,20) ,         LS(5) ,      XMAX(5)              IMAGE    9
      DIMENSION       AD(250) ,       XD(250) ,      YD(250)              IMAGE   10
      DIMENSION      IND(350) ,       AW(350) ,     MSYM(20)              IMAGE   11
      DIMENSION     AB(50,20) ,       XLE(20) ,      CLR(20)              IMAGE   12
      DIMENSION       CLI(20) ,       CMR(20) ,      CMI(20)              IMAGE   13
      DIMENSION       CPR(20) ,       CPI(20) ,       AC(20)              IMAGE   14
      DIMENSION     YNAME(12) ,   XNAME1(12) ,   XNAME2(12)               IMAGE   15
      DIMENSION    YNAME2(12) ,     CLRN(12) ,     CLIN(12)               IMAGE   16
      DIMENSION      CMRN(12) ,     CMIN(12) ,     CPRN(12)               IMAGE   17
      DIMENSION      CPIN(12)                                             IMAGE   18
      DIMENSION ITAPES(50)                                                IMAGE   19
      DIMENSION YS(20)                                                    IMAGE   20
C                                                                         IMAGE   21
      COMMON/TOMB/XW,YW,NDB,LS,XMAX,NWB,AD,XD,YD,IND,AW                   IMAGE   22
      COMMON/IDIOT/ CLEXR, CLEYR, CTEXR, CTEYR, NCLER, NCTER, NS          IMAGE   23
      COMMON/KIMA / LZ(5), IINC(5)                                        IMAGE   24
      COMMON/CTAPES/ ITAPES                                               IMAGE   25
      COMMON /COMA/ LC(40) , BR                                           IMAGE   26
C                                                                         IMAGE   27
      COMPLEX  PP(350), PPP(50,20)                                        IMAGE   28
      COMPLEX  CLT(40), XCP(40), YCP(40)                                  IMAGE   29
C                                                                         IMAGE   30
C     ---- PRESSURES AND LIFT COEFFICIENTS ----                           IMAGE   31
      LOGICAL SS                                                          IMAGE   32
      DATA     YNAME/1HX,1H ,1HC,1HO,1HO,1HR,1HD,1H.,1H(,1HI,1HN,1H)/     IMAGE   33
      DATA    XNAME1/1H ,1HP,1HR,1HE,1HS,1HS,1H-,1HR,1HE,1HA,1HL,1H /     IMAGE   34
      DATA    XNAME2/1H ,1HP,1HR,1HE,1HS,1HS,1H-,1HI,1HM,1HA,1HG,1H /     IMAGE   35
      DATA    YNAME2/1HY,1H ,1HC,1HO,1HO,1HR,1HD,1H.,1H(,1HI,1HN,1H)/     IMAGE   36
      DATA      CLRN/1H ,1HC,1HL,1H-,1HR,1HE,1HA,1HL,1H ,1H ,1H ,1H /     IMAGE   37
      DATA      CLIN/1H ,1HC,1HL,1H-,1HI,1HM,1HA,1HG,1H ,1H ,1H ,1H /     IMAGE   38
      DATA      CMRN/1H ,1HC,1HM,1H-,1HR,1HE,1HA,1HL,1H ,1H ,1H ,1H /     IMAGE   39
      DATA      CMIN/1H ,1HC,1HM,1H-,1HI,1HM,1HA,1HG,1H ,1H ,1H ,1H /     IMAGE   40
      DATA      CPRN/1H ,1HC,1HP,1H-,1HR,1HE,1HA,1HL,1H ,1H ,1H ,1H /     IMAGE   41
      DATA      CPIN/1H ,1HC,1HP,1H-,1HI,1HM,1HA,1HG,1H ,1H ,1H ,1H /     IMAGE   42
C                                                                         IMAGE   43
C                                                                         IMAGE   44
      ITAPEW = ITAPES(6)                                                  IMAGE   45
      MTAP12 = ITAPES(12)                                                 IMAGE   46
      MTAP12 =  ITAPES(32)                                                IMAGE   47
C                                                                         IMAGE   48
      TOL = 1.0E-05                                                       IMAGE   49
      SS  =  .FALSE.                                                      IMAGE   50
      IF ( LC(33) .NE. 0 )    SS = .TRUE.                                 IMAGE   51
      L = LZ(KIX)                                                         IMAGE   52
      INC = IINC(KIX)                                                     IMAGE   53
      REWIND MTAP12                                                       IMAGE   54
      XES = ES * 12.0                                                     IMAGE   55
      XEL = EL * XES                                                      IMAGE   56
      ARBX = XES * XEL                                                    IMAGE   57
      SURF = 0.0                                                          IMAGE   58
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                  701 LS      (5)          706 XMXX    (5)          711 NWB     (1)
                                  712 AD      (250)        962 XD      (250)       1212 YD      (250)
                                 1462 IND     (350)       1812 AW      (350)

STATISTICS
  PROGRAM LENGTH                 2411B     1289
  CM LABELED COMMON LENGTH       4244B     2212
         52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
     0  KK         INTEGER               F.P.      REFS       38       39  DEFINED        1
   316  KOUNT      INTEGER                         REFS       42       50  DEFINED       41        59
  1275  LS         INTEGER     ARRAY    TOMB       REFS       10
     0  MDRAW      INTEGER               F.P.      REFS       63  DEFINED        1
   302  MTAP2      INTEGER                         REFS       26  DEFINED       16  I/O REFS       18        66
  1274  NDB        INTEGER              TOMB       REFS       10       21       26       28        42        50
     0  NS         INTEGER               F.P.      REFS       24  DEFINED        1
  1307  NWB        INTEGER              TOMB       REFS       10
   414  QHOL       REAL        ARRAY               REFS        6       55  DEFINED       13
     0  VBO        REAL                  F.P.      REFS       38       39  DEFINED        1
   315  X          REAL                            REFS       43       51       60       61  DEFINED        40        60
  1702  XD         REAL        ARRAY    TOMB       REFS       10       23       43       51
   305  XMAX       REAL                            REFS       23       61  DEFINED       20        23
  1302  XMXX       REAL        ARRAY    TOMB       REFS       10
     0  XW         REAL        ARRAY    TOMB       REFS       10
  2274  YD         REAL        ARRAY    TOMB       REFS       10       22       44       54
   304  YMIN       REAL                            REFS       22       44       54  DEFINED        19        22
   536  YW         REAL        ARRAY    TOMB       REFS       10
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
        ALOG10     REAL      1 LIBRARY      35
        CNRW                 3              26

INLINE FUNCTIONS   TYPE    ARGS          DEF LINE  REFERENCES
        ABS        REAL      1  INTRIN                 31        48
        AIMAG      REAL      1  INTRIN                 30        47
        AMAX1      REAL      0  INTRIN                 23        31
        AMIN1      REAL      0  INTRIN                 22
        MINO       INTEGER   0  INTRIN                 57
        REAL       REAL      1  INTRIN                 29        46
        SIGN       REAL      2  INTRIN                 36

STATEMENT LABELS               DEF LINE   REFERENCES
   177  1                         65         24        63
     0  2                         31         28
    67  3                         38         33        34
   133  4                         49         42        43
     0  5                         52         50
   145  6                         54         51
     0  10                        23         21
   237  100      FMT              70         38
   256  110      FMT              73         39
    33  200                       27         64
   101  300                       42         61
   165  400                       60         53

LOOPS   LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
    17  10        I           21 23         6B       INSTACK
    27  1         IM          24 65       153B                  EXT REFS  NOT INNER
    44  2         I           28 31        11B          OPT
   103  4         I           42 49        33B                  EXT REFS
   137  5         I           50 52         5B       INSTACK     EXITS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
        CTAPES      50             0 ITAPES (50)
        TOMB      2162             0 XW      (350)          350 YW     (350)            700 NDB     (1)
```

```
                  WRITE (ITAPEW,FMT)  (H(I) , I=IY1,IY2)                                        DSPDDW      59
                  KOUNT   =   IK + 1                                                            DSPDDW      60
 60           400 X   =   X + 1.0                                                               DSPDDW      61
                  IF ( X  .LE. XMAX )       GO TO 300                                           DSPDDW      62
                  ICAP   =   ICAP + 1                                                           DSPDDW      63
                  IF ( ICAP .EQ. 2 .AND. MDRAW .NE. 0 )       GO TO 1                           DSPDDW      64
                  IF ( ICAP .EQ. 2 )       GO TO 200                                            DSPDDW      65
 65             1 CONTINUE                                                                      DSPDDW      66
                  REWIND MTAP2                                                                  DSPDDW      67
            C                                                                                   DSPDDW      68
            C     FORMATS                                                                       DSPDDW      69
            C                                                                                   DSPDDW      70
 70           100 FORMAT (1H1,10X49HREAL PART OF DIAPHRAGM DOWNWASH VALUES TIMES 1.0 DSPDDW     71
                 1E,I3 / 10X9HFOR MODE ,I3,5X12HFOR SURFACE ,I3,5X                              DSPDDW      72
                 223HFOR REDUCED VELOCITY = ,E10.3  //)                                         DSPDDW      73
              110 FORMAT (1H1,10X54HIMAGINARY PART OF DIAPHRAGM DOWNWASH VALUES TIME DSPDDW     74
                 1S 1.0E, I3 / 10X9HFOR MODE ,I3,5X12HFOR SURFACE , I3, 5X                      DSPDDW      75
 75              2 23HFOR REDUCED VELOCITY = , E10.3  //)                                       DSPDDW      76
            C                                                                                   DSPDDW      77
            C                                                                                   DSPDDW      78
                  RETURN                                                                        DSPDDW      79
                  END                                                                           DSPDDW      80
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE      REFERENCES
    3  DSPDDW         1          78

VARIABLES      SN  TYPE            RELOCATION
   314  AA         REAL                              REFS       2*36   DEFINED       35
  1310  AD         REAL         ARRAY    TOMB        REFS         10
  3424  AW         REAL         ARRAY    TOMB        REFS         10
   436  DWSH       COMPLEX      ARRAY                REFS          7        26        29        30        46        47
   406  FMT        REAL         ARRAY                REFS          6        58   DEFINED        12        55
   324  H          REAL         ARRAY                REFS          6        48        58   DEFINED        46        47        48
   312  HH         REAL                              REFS         31   DEFINED        29        30
   311  HMAX       REAL                              REFS         31      2*33        34        35   DEFINED        27        31
   306  I          INTEGER                           REFS         22        23        29        30        43        44        45
                                                       46         47        51        54        58   DEFINED        21        28
                                                       42         50        58
   310  ICAP       INTEGER                           REFS         29        30        38        39        46        47        62
                                                       63         64   DEFINED        25        62
   320  IK         INTEGER                           REFS         59   DEFINED        45
   307  IM         INTEGER                           REFS         38        39   DEFINED        24
  2666  IND        INTEGER      ARRAY    TOMB        REFS         10
   313  ISCL       INTEGER                           REFS         37        38        39        46        47
                                                  DEFINED         32        36        37
     0  ITAPES     INTEGER      ARRAY    CTAPES      REFS          5         9        16        17
   303  ITAPEW     INTEGER                        DEFINED         17   I/O REFS        38        39        58
   317  IY         INTEGER                           REFS         46        47      2*48        57   DEFINED        44
   321  IYY        INTEGER                           REFS         55        56   DEFINED        54
   322  IY1        INTEGER                           REFS         58   DEFINED        56
   323  IY2        INTEGER                           REFS         58   DEFINED        57
```

```
      SUBROUTINE DSPDDW ( KK , NS , VBO , MDRAW )
C
C     PROVIDES DISPLAY OF DIAPHRAGM DOWNWASH VELOCITIES
C
      DIMENSION ITAPES(50)
      DIMENSION         H(50) ,        FMT(6) ,      QHOL(18)
      COMPLEX        DWSH(500)
C
      COMMON /CTAPES/  ITAPES
      COMMON /TOMB/ XW(350) , YW(350) , NDB , LS(5) , XMXX(5) , NWB ,
     1              AD(250) , XD(250) , YD(250) , IND(350), AW(350)
      DATA FMT /4H(    ,4H    ,4HX,   ,4H18(1,4HX,F6,4H.3))/
      DATA QHOL /1H2,1H9,2H16,2H23,2H30,2H37,2H44,2H51,2H58,2H65,2H72,
     1           2H79,2H86,2H93,3H100,3H107,3H114,3H121/
C
      MTAP2  = ITAPES(22)
      ITAPEW=  ITAPES(6)
      REWIND MTAP2
      YMIN  =  100.0
      XMAX  =  0.0
      DO 10  I = 1,NDB
      YMIN  =  AMIN1 (YMIN , YD(I))
   10 XMAX  =  AMAX1 (XMAX , XD(I))
      DO 1   IM = 1,NS
      ICAP  =  1
      CALL CNRW (-MTAP2,DWSH,NDB)
  200 HMAX  =  0.0
      DO 2  I = 1,NDB
      IF ( ICAP .EQ. 1 )       HH = REAL (DWSH(I))
      IF ( ICAP .EQ. 2 )       HH = AIMAG (DWSH(I))
    2 HMAX  =  AMAX1 ( HMAX , ABS(HH) )
      ISCL  =  0
      IF ( HMAX .GE. 1.0 .AND. HMAX .LT. 10.0 )   GO TO 3
      IF ( HMAX .EQ. 0.0 )     GO TO 3
      AA    =  ALOG10 (HMAX)
      ISCL  =  AA - 0.5 + SIGN(0.5,AA)
      ISCL  =  -ISCL
    3 IF ( ICAP .EQ. 1 )       WRITE (ITAPEW,100)  ISCL , IM , KK , VBO
      IF ( ICAP .EQ. 2 )       WRITE (ITAPEW,110)  ISCL , IM , KK , VBO
      X     =  0.0
      KOUNT  =  1
  300 DO 4  I = KOUNT,NDB
      IF ( XD(I) .NE. X )      GO TO 4
      IY   =  YD(I) + 1.0 - YMIN
      IK    =  I
      IF ( ICAP .EQ. 1 )       H(IY) =  REAL (DWSH(I)) * 10.0**ISCL
      IF ( ICAP .EQ. 2 )       H(IY) = AIMAG (DWSH(I)) * 10.0**ISCL
      IF ( ABS(H(IY)) .LT. 0.001 )      H(IY) = 0.0
    4 CONTINUE
      DO 5  I = KOUNT,NDB
      IF ( XD(I) .EQ. X )      GO TO 6
    5  CONTINUE
      GO TO 400
    6 IYY  =  YD(I) - YMIN
      FMT(2)  =  QHOL (IYY+1)
      IY1   =  IYY + 1
      IY2   =  MINO ( 18 , IY )
```

[illegible]	17205B	7813
[illegible] COMMON LENGTH	5162B	2674
[illegible] CM USED		

```
      SUBROUTINE KERN                                                   KERN       2
C                                                                       KERN       3
C     CALLING PROGRAM FOR COLLOCATION PROCEDURE                         KERN       4
C                                                                       KERN       5
C     SUBSONIC KERNEL FUNCTION FLUTTER PROGRAM                          KERN       6
C                                                                       KERN       7
C     MIT METHOD                                                        KERN       8
C     MAIN PROGRAM                                                      KERN       9
C                                                                       KERN      10
      DIMENSION              LIP(5) ,             AL(5) ,        BTP(5) KERN      11
      DIMENSION              MCP(5) ,             MC(5)                 KERN      12
      DIMENSION               NC(5) ,            IRP(5) ,        IRC(5) KERN      13
      DIMENSION              NRS(5) ,            NPR(5) ,       NCLA(5) KERN      14
      DIMENSION             NTEX(5) ,           NTEY(5) ,      X1(10,5) KERN      15
      DIMENSION            Y1(10,5) ,        XMW1(10,5) ,    RBB1(10,5) KERN      16
      DIMENSION          XII1(20,5) ,        XIS1(60,5) ,   ETA1(100,5) KERN      17
      DIMENSION         XIM1(100,5) ,       SBB1(100,5) ,    XMP1(20,5) KERN      18
      DIMENSION             KKF1(5) ,             AB(5)                 KERN      19
      DIMENSION           QR(20,20) ,         QI(20,20)                 KERN      20
      DIMENSION          QRC(20,20) ,        QIC(20,20) ,       KGH1(5) KERN      21
      DIMENSION              LMU(5)                                     KERN      22
      DIMENSION PBB1(20,5), LKG(5), LKF(5)                              KERN      23
      DIMENSION ITAPES(50)                                              KERN      24
      DIMENSION          BIR(25,20) ,        BII(25,20)                 KERN      25
      DIMENSION         IKM(5)                                          KERN      26
      DIMENSION TSHF(1)                                                 KERN      27
      DIMENSION VBO(30), RVBO(15)                                       KERN      28
C                                                                       KERN      29
      LOGICAL  KQINT                                                    KERN      30
C                                                                       KERN      31
      COMMON /COMA/ LC(40) , BR                                         KERN      32
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                 KERN      33
      COMMON /FLUTQ/ QMWT(40,5), QMU(5)                                 KERN      34
      COMMON /COMB  / ISI,M,IRR,N,ISS,LIRR,NO1,NO2,NMOD,ABO,ALO,M2      KERN      35
      COMMON/COMC/NPRES,NCL,NTEPX,NTEPY,NPRD,XMP(20),PBBO(20),BBT       KERN      36
      COMMON/COMD/X(10),Y(10),XMW(10),RBBO(10),XII(20),XIS(60),ETAS(100) KERN     37
     1,XIMW(100),SBBO(100)                                              KERN      38
      COMMON/COMF/MCC,NLRR,NNP,XCP                                      KERN      39
      COMMON/COMH/KQR,KGH,KFF,NHV                                       KERN      40
      COMMON/COMI/ZK,ZKX,YOE,YOEX                                       KERN      41
      COMMON/COMJ/ZM,ZMX,XOE,XOEX,ZETA,BETAX,RE4,RE4X,RM4,RM4X          KERN      42
      COMMON/COMX/X1A(100),Y1A(100)                                     KERN      43
      COMMON /CTSHF / LTSHF ,TSHF                                       KERN      44
      COMMON / CTAPES / ITAPES                                          KERN      45
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              KERN      46
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA KERN      47
     1                ,ITAPET                                           KERN      48
C                                                                       KERN      49
      ITAPEW = ITAPES(6)                                                KERN      50
      MTAP2  =  ITAPES(22)                                              KERN      51
      MTAP11 =  ITAPES(31)                                              KERN      52
      MTAP50 = ITAPES(50)                                               KERN      53
      NROWS  =  1                                                       KERN      54
      NCOLS  =  3                                                       KERN      55
      KTABLE =  2                                                       KERN      56
      CALL PTABLE (1,48,48                                              KERN      57
     1   HSUBSONIC UNSTEADY AERODYNAMICS USING COLLOCATION)             KERN      58
```

```
      KTABLE =  2
      CALL PTABLE (1,18,18
     1   HPROCEDURE (KERNEL))
C
C
      KQINT  =   .FALSE.
      ZETA  =  BETA
      LC3  =  LC(3)
      ZM     =  FMACH
      IF ( LC(1) .EQ. -1 )    KQINT = .TRUE.
      IF ( LC(13) .NE. 0 )    KQINT = .TRUE.
      LC2  =  LC(2)
C
C
      REWIND MTAP2
      REWIND MTAP11
      READ (ITAPER,102)   NLKG , NLKF
C     CONTROL WORDS FOR PRINTOUT
C     KQR=SUM QRS , KGH1(I)=A ARRAY , KFF1(I)=KERNEL FUNCTION LISTING
      KQR = LC(29)
      IF (NLKG.NE.0) READ (ITAPER,102) (LKG(I),I=1,NLKG)
      IF (NLKF.NE.0) READ (ITAPER,102) (LKF(I),I=1,NLKF)
      DO 1 I = 1,5
      KGH1(I) = 0
      KKF1(I) = 0
      II = I
      IF (NLKG.EQ.0) GO TO 10
      DO 7 J = 1,NLKG
      IF (LKG(J).EQ.II) GO TO 8
    7 CONTINUE
      GO TO 10
    8 KGH1(I) = 1
   10 IF (NLKF.EQ.0) GO TO 1
      DO 9 J = 1,NLKF
      IF (LKF(J).EQ.II) GO TO 11
    9 CONTINUE
      GO TO 1
   11 KKF1(I) = 1
    1 CONTINUE
C     READ COLLOCATION AND INTEGRATION CONTROLS
      DO 15 I = 1,LC3
      READ (ITAPER,102) MCP(I) , MC(I) , NC(I)
      AMC = MC(I)
      ANC = 2*NC(I) - 1
      NC(I) = (AMC + 0.5) * ANC
      READ (ITAPER,102) IRP(I) , IRC(I) , NRS(I)
   15 CONTINUE
      DO 16  I = 1,LC3
      READ (ITAPER,103)  AB(I), AL(I), BTP(I), IKM(I), NPR(I), NCLA(I)
      NPRD = NPR(I) + NCLA(I)
      NTEX(I) = 1
      NTEY(I) = 1
      IF (NPRD.EQ.0) GO TO 16
      READ (ITAPER,102) NTEX(I) , NTEY(I)
   16 CONTINUE
C
      DO 18 I=1,LC3
```

```
      NSURF=I                                                           KERN     116
      ISI = I                                                           KERN     117
      M = MC(I)                                                         KERN     118
      IRR = IRC(I)                                                      KERN     119
      N = NC(I)                                                         KERN     120
      ISS = NRS(I)*(IRR+1)                                              KERN     121
      LIRR = IRR/2                                                      KERN     122
      IQS = ISS - 2*(ISS/2)                                             KERN     123
      IRS = ISS/2 + IQS                                                 KERN     124
      NO1 = M*LIRR                                                      KERN     125
      NO2 = 2*NO1                                                       KERN     126
      NMOD  = LC2                                                       KERN     127
      ABO = AB I)                                                       KERN     128
      ALO = AL(I)                                                       KERN     129
      NPRES = NPR(I)                                                    KERN     130
      NCL = NCLA(I)                                                     KERN     131
      NTEPX = NTEX(I)                                                   KERN     132
      NTEPY = NTEY(I)                                                   KERN     133
      NPRD = NPRES+NCL                                                  KERN     134
      M2 = 2*M                                                          KERN     135
C                                                                       KERN     136
C     CALL ROUTINE            ***** GEOM   *****           CALL ROUTINE KERN     137
      CALL GEOM(NSURF)                                                  KERN     138
C     PUT MODAL DATA ON TAPE                                            KERN     139
   20 DO 22 J =1,M                                                      KERN     140
   22 X1(J,I) = X(J)                                                    KERN     141
      DO 23 J =1,LIRR                                                   KERN     142
      Y1(J,I) = Y(J)                                                    KERN     143
      XMW1(J,I) = XMW(J)                                                KERN     144
   23 RBB1(J,I) = RBBO(J)                                               KERN     145
      DO 24 J =1,M2                                                     KERN     146
   24 XII1(J,I) = XII(J)                                                KERN     147
      DO 25 J=1,N                                                       KERN     148
   25 XIS1(J,I) = XIS(J)                                                KERN     149
      DO 26 J =1,ISS                                                    KERN     150
      ETA1(J,I) = ETAS(J)                                               KERN     151
      XIM1(J,I) = XIMW(J)                                               KERN     152
   26 SBB1(J,I) = SBBO(J)                                               KERN     153
      IF(NCL.EQ.O)GO TO 18                                              KERN     154
      DO 28 J=1,NTEPY                                                   KERN     155
      XMP1(J,I) = XMP(J)                                                KERN     156
   28 PBB1(J,I) = PBBO(J)                                               KERN     157
   18 CONTINUE                                                          KERN     158
C                                                                       KERN     159
C     CALL ROUTINE            ***** TIME   *****           CALL ROUTINE KERN     160
      CALL TIMEB (23,23HFROM KERN, AFTER GEOM  )                        KERN     161
   19 REWIND MTAP2                                                      KERN     162
C     PRINT OUT PRESSURE POLYNOMIAL DEGREE                              KERN     163
   46 WRITE (ITAPEW,123)                                                KERN     164
      DO 147 I=1,LC3                                                    KERN     165
  147 WRITE (ITAPEW,124)I,MCP(I),IRP(I)                                 KERN     166
C     READ CONTROL WORDS FOR WEIGHTING GEN. AIR FORCES                  KERN     167
C     CONTROL WORDS FOR INTERMEDIATE PRINTOUT AND FLUTTER ANALYSIS      KERN     168
      NRF = LC(4)                                                       KERN     169
      IF(LC(1) .EQ. -1) GO TO 42                                        KERN     170
      IF(LC(1) .EQ. 2 .OR. LC(33) .EQ. 1) GO TO 43                      KERN     171
      IF (LC(13).EQ.1)  NRF = NRVBO                                     KERN     172
```

```
      GO TO 42                                                          KERN     173
   43 NRF = 1                                                           KERN     174
   42 CONTINUE                                                          KERN     175
C     REDUCED VELOCITY LOOP                                             KERN     176
      IGH = 0                                                           KERN     177
      DO 200 II= 1,NRF                                                  KERN     178
      DO 88 J=1,LC2                                                     KERN     179
      DO 88 I=1,LC2                                                     KERN     180
      QRC(I,J) =  0.0                                                   KERN     181
   88 QIC(I,J) =  0.0                                                   KERN     182
C     SURFACE LOOP                                                      KERN     183
      REWIND MTAP2                                                      KERN     184
      DO 89 ISU=1,LC3                                                   KERN     185
      IGH = IGH + 1                                                     KERN     186
      ISI    =  ISU                                                     KERN     187
C                                                                       KERN     188
      KGH=KGH1(ISU)                                                     KERN     189
      KFF=KKF1(ISU)                                                     KERN     190
      IND = IKM(ISU)                                                    KERN     191
      ABO = AB(ISU)/12.0                                                KERN     192
      ALO=AL(ISU)/12.0                                                  KERN     193
      BTIP = BTP(ISU)/12.0                                              KERN     194
      BBT=BTIP/ABO                                                      KERN     195
      M=MC(ISU)                                                         KERN     196
      N = NC(ISU)                                                       KERN     197
      M2=M+M                                                            KERN     198
C                                                                       KERN     199
      KSS=0                                                             KERN     200
      IF (LC(33).NE.0.OR.LC(1).EQ.2)    KSS = 1                         KERN     201
      ZK=0.0                                                            KERN     202
      IF ( KSS .EQ. 0 .AND. KQINT )     VBOR = RVBO(II)                 KERN     203
      IF ( KSS .EQ. 0 .AND. .NOT. KQINT )    VBOR = VBO(II)             KERN     204
      IF(KSS.EQ.0)ZK=ABO/(VBOR*[illegible])                             KERN     205
      IF (KSS .NE. 0) VBOR = 0.0                                        KERN     206
      IRR=IRC(ISU)                                                      KERN     207
      LIRR=IRR/2                                                        KERN     208
      ISS = NRS(ISU)*(IRR+1)                                            KERN     209
      IQS = ISS - 2*(ISS/2)                                             KERN     210
      IRS = ISS/2 + IQS                                                 KERN     211
      NO1=M*LIRR                                                        KERN     212
      NO2=2*NO1                                                         KERN     213
      MCC=MCP(ISU)                                                      KERN     214
      NLRR=IRP(ISU)/2                                                   KERN     215
      NNP=MCC*NLRR                                                      KERN     216
      DO 92 I=1,M                                                       KERN     217
   92 X(I)=X1(I,ISU)                                                    KERN     218
      DO 93 I=1,LIRR                                                    KERN     219
      Y(I)=Y1(I,ISU)                                                    KERN     220
      XMW(I)=XMW1(I,ISU)                                                KERN     221
   93 RBBO(I)=RBB1(I,ISU)                                               KERN     222
      DO 94 I=1,M2                                                      KERN     223
   94 XII(I)=XII1(I,ISU)                                                KERN     224
      DO 95 I=1,N                                                       KERN     225
   95 XIS(I)=XIS1(I,ISU)                                                KERN     226
      DO 96 I=1,ISS                                                     KERN     227
      ETAS(I)=ETA1(I,ISU)                                               KERN     228
      XIMW(I)=XIM1(I,ISU)                                               KERN     229
```

```
           96 SBBO(I)=SBB1(I,ISU)                                            KERN     230
              NPRES=NPR(ISU)                                                 KERN     231
              NCL=NCLA(ISU)                                                  KERN     232
              NPRD=NPRES+NCL                                                 KERN     233
              NTEPX=NTEX(ISU)                                                KERN     234
              NTEPY=NTEY(ISU)                                                KERN     235
              IF (NCL.EQ.O) GOTO 13                                          KERN     236
              KK = NTEPY                                                     KERN     237
              DO 98 I=1,KK                                                   KERN     238
              XMP(I)=XMP1(I,ISU)                                             KERN     239
           98 PBBO(I)=PBB1(I,ISU)                                            KERN     240
           13 CONTINUE                                                       KERN     241
              NTAPE  =  11                                                   KERN     242
              IF (LC(22) .EQ. 1) GOTO 203                                    KERN     243
        C                                                                    KERN     244
        C     CALL ROUTINE            ***** INVK   *****        CALL ROUTINE KERN     245
              CALL INVK(IND )                                                KERN     246
              CALL TIMEB (23,23HFROM KERN, AFTER INVK  )                     KERN     247
        C                                                                    KERN     248
        C     CALL ROUTINE            ***** GRS    *****        CALL ROUTINE KERN     249
          203 CALL GRS (QR,QI,IND,                BIR,BII)                   KERN     250
              IF (NPRD.NE.O) CALL PRESS (BIR,BII,IND)                        KERN     251
              CALL TIMEB (23,23HFROM KERN, AFTER PRESS )                     KERN     252
        C     ELIMINATE MODES AND WEIGHTING                                  KERN     253
              DO 217 I=1,LC2                                                 KERN     254
              ZQOI=QMWT(I,ISU)                                               KERN     255
              DO 217 J=1,LC2                                                 KERN     256
              ZQOJ=QMWT(J,ISU)                                               KERN     257
              QR(I,J)=QR(I,J)*ZQOI*ZQOJ*QMU(ISU)                             KERN     258
          217 QI(I,J)=QI(I,J)*ZQOI*ZQOJ*QMU(ISU)                             KERN     259
              IF ( LC(6).EQ. O )     GO TO 6                                 KERN     260
        C     WRITE REVISED QRS TERMS                                        KERN     261
              LINE = 8                                                       KERN     262
              KONS = LC2/3 + LC2 - 3*(LC2/3) + 1                             KERN     263
              WRITE (ITAPEW,128)ZM,VBOR   ,ISU                               KERN     264
              DO 218 I=1,LC2                                                 KERN     265
              LINE = LINE + KONS                                             KERN     266
              IF (LINE.LE.62)  GO TO 218                                     KERN     267
              LINE = 8 + KONS                                                KERN     268
              WRITE (ITAPEW,128) ZM , VBOR    , ISU                          KERN     269
          218 WRITE (ITAPEW,129)(QR(I,J),QI(I,J),J=1,LC2)                    KERN     270
            6 CONTINUE                                                       KERN     271
        C     SUM OF QRS                                                     KERN     272
              DO 219 I=1,LC2                                                 KERN     273
              DO 219 J=1,LC2                                                 KERN     274
              QRC(I,J) =  QRC(I,J) + QR(I,J)                                 KERN     275
          219 QIC(I,J) =  QIC(I,J) + QI(I,J)                                 KERN     276
           89 CONTINUE                                                       KERN     277
              IF (LC(6).EQ.O)         GO TO 223                              KERN     278
              WRITE (ITAPEW,130)ZM,VBOR                                      KERN     279
              DO 225 I=1,LC2                                                 KERN     280
          225 WRITE (ITAPEW,129) (QRC(I,J),QIC(I,J), J=1,LC2)                KERN     281
          223 IF (LC(1).EQ.O) GO TO 200                                      KERN     282
              DO 72 I=1,LC2                                                  KERN     283
           72 WRITE(MTAP50)  (QRC(I,J),QIC(I,J),J=1,LC2)                     KERN     284
          200 CONTINUE                                                       KERN     285
              IF ( LC(22) .NE. O )    REWIND NTAPE                           KERN     286
```

```
                IF (.NOT.KQINT) GO TO 2                                         KERN       287
                CALL QINTP (MTAP50,LC2,LC(4),RVBO,NRVBO,ZM,VBO)                 KERN       288
              2 CONTINUE                                                        KERN       289
          C                                                                     KERN       290
          C                                                                     KERN       291
          C FORMATS                                                             KERN       292
          C                                                                     KERN       293
            102 FORMAT(10I5)                                                    KERN       294
            103 FORMAT (3E10.3,3I5)                                             KERN       295
            123 FORMAT (1H1,4X32HNO. OF PRESSURE POLYNOMIAL TERMS, /8X          KERN       296
               1         11HSURFACE NO.,4X,9HCHORDWISE,4X,8HSPANWISE, /)        KERN       297
            124 FORMAT(13X,I2,12X,I2,11X,I2)                                    KERN       298
            128 FORMAT (1H1,5X38HGENERALIZED AIR FORCES FOR MACH NO. = ,E10.3,/5X KERN     299
               1         6HVBO = ,E10.3,/5X14HSURFACE NO. = ,I3,5X7HBY ROWS,    KERN       300
               2         10X11H(REAL,IMAG), /)                                  KERN       301
            129 FORMAT(/( T3,1PE10.3,T15,1PE10.3, T1,2H (,T13,2H, , T25,2H) ,   KERN       302
               1          T29,1PE10.3,T41,1PE10.3,T27,2H (,T39,2H, , T51,2H) ,  KERN       303
               2          T55,1PE10.3,T67,1PE10.3,T53,2H (,T65,2H, ,T77,2H) ))  KERN       304
            130 FORMAT (1H1,5X25HSUM OF QRS FOR MACH NO = ,E10.3,/5X5HVBO= ,E10.3, KERN    305
               1         /15X7HBY ROWS,10X11H(REAL,IMAG), /)                    KERN       306
          C                                                                     KERN       307
                RETURN                                                          KERN       308
                END                                                             KERN       309
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    1  KERN           1           307

VARIABLES      SN  TYPE            RELOCATION
 5700  AB          REAL        ARRAY                 REFS       18       127       191   DEFINED      106
   11  ABO         REAL                  COMB        REFS       34       194       204   DEFINED      127       191
 1347  AL          REAL        ARRAY                 REFS       10       128       192   DEFINED      106
   12  ALO         REAL                  COMB        REFS       34   DEFINED       128       192
 1320  AMC         REAL                              REFS      102   DEFINED       100
 1321  ANC         REAL                              REFS      102   DEFINED       101
   55  BBT         REAL                  COMC        REFS       35   DEFINED       194
    1  BETA        REAL                  FLUTAN      REFS       32        64
    5  BETAX       REAL                  COMJ        REFS       41
12161  BII         REAL        ARRAY                 REFS       24       249       250
11175  BIR         REAL        ARRAY                 REFS       24       249       250
   50  BR          REAL                  COMA        REFS       31       204
 1331  BTIP        REAL                              REFS      194   DEFINED       193
 1354  BTP         REAL        ARRAY                 REFS       10       193   DEFINED       106
  170  ETAS        REAL        ARRAY     COMD        REFS       36       150   DEFINED       227
 2573  ETA1        REAL        ARRAY                 REFS       16       227   DEFINED       150
    0  FMACH       REAL                  FLUTAN      REFS       32        66
 1315  I           INTEGER                           REFS       78        79        81        82        83        89        95
                                                      3*99      100       101       102     3*103     6*106     2*107       108
                                                       109    2*111       115       116       117       118       119       120
                                                       127      128       129       130       131       132       140       142
                                                       143      144       146       148       150       151       152       155
                                                       156    3*165       180       181     2*217     2*219     2*220     2*221
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                2*223    2*225    2*227    2*228    2*229    2*238    2*239      254
                                                2*257    2*258    2*269    3*274    3*275    2*280    2*283
                                              DEFINED       78       79       80       98      105      114      164
                                                  179      216      218      222      224      226      237      253
                                                  264      272      279      282
  1326  IGH         INTEGER                      REFS      185  DEFINED      176      185
  1316  II          INTEGER                      REFS       86       92      202      203  DEFINED       83      177
 13145  IKM         INTEGER    ARRAY             REFS       25      190  DEFINED      106
  1330  IND         INTEGER                      REFS      245      249      250  DEFINED      190
  1323  IQS         INTEGER                      REFS      123      210  DEFINED      122      209
  1405  IRC         INTEGER    ARRAY             REFS       12      118      206  DEFINED      103
  1400  IRP         INTEGER    ARRAY             REFS       12      165      214  DEFINED      103
     2  IRR         INTEGER           COMB       REFS       34      120      121      207      208
                                              DEFINED      118      206
  1324  IRS         INTEGER                   DEFINED      123      210
     0  ISI         INTEGER           COMB       REFS       34  DEFINED      116      186
     4  ISS         INTEGER           COMB       REFS       34    2*122      123      149    2*209      210      226
                                              DEFINED      120      208
  1327  ISU         INTEGER                      REFS      186      188      189      190      191      192      193
                                                  195      196      206      208      213      214      217      219
                                                  220      221      223      225      227      228      229      230
                                                  231      233      234      238      239      254      256      257
                                                  258      263      268  DEFINED      184
     2  ITAPEP      INTEGER           COMRWP     REFS       45
     0  ITAPER      INTEGER           COMRWP     REFS       45 I/O REFS       74       78       79       99      103
                                                  106      111
     0  ITAPES      INTEGER    ARRAY  CTAPES     REFS       23       44       49       50       51       52
     7  ITAPET      INTEGER           CTABLE     REFS       46
     1  ITAPEW      INTEGER           COMRWP     REFS       45  DEFINED       49 I/O REFS      163      165      263
                                                  268      269      278      280
  1317  J           INTEGER                      REFS       86       92    2*140    2*142    2*143    2*144    2*146
                                                2*148    2*150    2*151    2*152    2*155    2*156      180      181
                                                  256    2*257    2*258    2*269    3*274    3*275    2*280    2*283
                                              DEFINED       85       91      139      141      145      147      149
                                                  154      178      255      269      273      280      283
     2  KFF         INTEGER           COMH       REFS       39  DEFINED      189
     1  KGH         INTEGER           COMH       REFS       39  DEFINED      188
 11005  KGH1        INTEGER    ARRAY             REFS       20      188  DEFINED       81       89
  1334  KK          INTEGER                      REFS      237  DEFINED      236
  5673  KKF1        INTEGER    ARRAY             REFS       18      189  DEFINED       82       95
  1341  KONS        INTEGER                      REFS      265      267  DEFINED      262
  1305  KQINT       LOGICAL                      REFS       29      202      203      286  DEFINED       63       67
                                                   68
     0  KQR         INTEGER           COMH       REFS       39  DEFINED       77
  1332  KSS         INTEGER                      REFS      202      203      204      205  DEFINED      199      200
     0  KTABLE      INTEGER           CTABLE     REFS       46  DEFINED       55       58
     5  KTABLO      INTEGER           CTABLE     REFS       46
     0  LC          INTEGER    ARRAY  COMA       REFS       31       65       67       68       69       77      168
                                                  169    2*170      171    2*200      242      259      277      281
                                                  285      287
  1312  LC2         INTEGER                      REFS      126      178      179      253      255    3*262      264
                                                  269      272      273      279      280      282      283      287
                                              DEFINED       69
  1311  LC3         INTEGER                      REFS       98      105      114      164      184
                                              DEFINED       65
  1340  LINE        INTEGER                      REFS      265      266  DEFINED      261      265      267
  1342  LIP         INTEGER   *UNDEF             REFS       10
```

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VARIABLES     SN  TYPE            RELOCATION
     5  LIRR      INTEGER              COMB      REFS        34      124      141      211      218
                                             DEFINED       121      207
 11170  LKF       INTEGER     ARRAY              REFS        22       92  DEFINED       79
 11163  LKG       INTEGER     ARRAY              REFS        22       86  DEFINED       78
 11012  LMU       INTEGER    *UNDEF              REFS        21
     0  LTSHF     INTEGER              CTSHF     REFS        43
     1  M         INTEGER              COMB      REFS        34      124      134      139    2*197      211      216
                                             DEFINED       117      195
  1366  MC        INTEGER     ARRAY              REFS        11      100      117      195  DEFINED       99
     0  MCC       INTEGER              COMF      REFS        38      215  DEFINED      213
  1361  MCP       INTEGER     ARRAY              REFS        11      165      213  DEFINED       99
  1307  MTAP11    INTEGER                    DEFINED        51 I/O REFS       73
  1306  MTAP2     INTEGER                    DEFINED        50 I/O REFS       72      161      183
  1310  MTAP50    INTEGER                        REFS       287  DEFINED       52 I/O REFS      283
    13  M2        INTEGER              COMB      REFS        34      145      222  DEFINED      134      197
     3  N         INTEGER              COMB      REFS        34      147      224  DEFINED      119      196
  1373  NC        INTEGER     ARRAY              REFS        12      101      119      196  DEFINED       99      102
     1  NCL       INTEGER              COMC      REFS        35      133      153      232      235
                                             DEFINED       130      231
  1424  NCLA      INTEGER     ARRAY              REFS        13      107      130      231  DEFINED      106
     3  NCOLS     INTEGER              CTABLE    REFS        46  DEFINED       54
     4  NCOLST    INTEGER              CTABLE    REFS        46
     3  NHV       INTEGER              COMH      REFS        39
  1314  NLKF      INTEGER                        REFS      2*79       90       91  DEFINED       74
  1313  NLKG      INTEGER                        REFS      2*78       84       85  DEFINED       74
     1  NLRR      INTEGER              COMF      REFS        38      215  DEFINED      214
    10  NMOD      INTEGER              COMB      REFS        34  DEFINED      126
     2  NNP       INTEGER              COMF      REFS        38  DEFINED      215
     6  NO1       INTEGER              COMB      REFS        34      125      212  DEFINED      124      211
     7  NO2       INTEGER              COMB      REFS        34  DEFINED      125      212
     6  NPAGEA    INTEGER              CTABLE    REFS        46
     1  NPASS     INTEGER              CTABLE    REFS        46
  1417  NPR       INTEGER     ARRAY              REFS        13      107      129      230  DEFINED      106
     4  NPRD      INTEGER              COMC      REFS        35      110      250  DEFINED      107      133      232
     0  NPRES     INTEGER              COMC      REFS        35      133      232  DEFINED      129      230
  1325  NRF       INTEGER                        REFS       177  DEFINED      168      171      173
     2  NROWS     INTEGER              CTABLE    REFS        46  DEFINED       53
  1412  NRS       INTEGER     ARRAY              REFS        13      120      208  DEFINED      103
    57  NRVBO     INTEGER              FLUTAN    REFS        32      171      287
  1322  NSURF     INTEGER                        REFS       137  DEFINED      115
  1335  NTAPE     INTEGER                    DEFINED       241 I/O REFS      285
     2  NTEPX     INTEGER              COMC      REFS        35  DEFINED      131      233
     3  NTEPY     INTEGER              COMC      REFS        35      154      236  DEFINED      132      234
  1431  NTEX      INTEGER     ARRAY              REFS        14      131      233  DEFINED      108      111
  1436  NTEY      INTEGER     ARRAY              REFS        14      132      234  DEFINED      109      111
    31  PBBO      REAL        ARRAY    COMC      REFS        35      156  DEFINED      239
 11017  PBB1      REAL        ARRAY              REFS        22      239  DEFINED      156
  6525  QI        REAL        ARRAY              REFS        19      249      258      269      275
                                             DEFINED       258
 10165  QIC       REAL        ARRAY              REFS        20      275      280      283  DEFINED      181      275
   310  QMU       REAL        ARRAY    FLUTQ     REFS        33      257      258
     0  QMWT      REAL        ARRAY    FLUTQ     REFS        33      254      256
  5705  QR        REAL        ARRAY              REFS        19      249      257      269      274
                                             DEFINED       257
  7345  QRC       REAL        ARRAY              REFS        20      274      280      283  DEFINED      180      274
    36  RBBO      REAL        ARRAY    COMD      REFS        36      144  DEFINED      221
  1671  RBB1      REAL        ARRAY              REFS        15      221  DEFINED      144
```

```
VARIABLES      SN  TYPE             RELOCATION
     6  RE4        REAL                COMJ       REFS        41
     7  RE4X       REAL                COMJ       REFS        41
    10  RM4        REAL                COMJ       REFS        41
    11  RM4X       REAL                COMJ       REFS        41
    40  RVBO       REAL        ARRAY   FLUTAN     REFS        27       32       202       287
   500  SBBO       REAL        ARRAY   COMD       REFS        36      152   DEFINED       229
  4543  SBB1       REAL        ARRAY              REFS        17      229   DEFINED       152
     1  TSHF       REAL        ARRAY   CTSHF      REFS        26       43
     2  VBO        REAL        ARRAY   FLUTAN     REFS        27       32       203       287
  1333  VBOR       REAL                           REFS       204      263       268       278   DEFINED      202      203
                                                   205
     0  X          REAL        ARRAY   COMD       REFS        36      140   DEFINED       217
     3  XCP        REAL                COMF       REFS        38
    50  XII        REAL        ARRAY   COMD       REFS        36      146   DEFINED       223
  1753  XII1       REAL        ARRAY              REFS        16      223   DEFINED       146
   334  XIMW       REAL        ARRAY   COMD       REFS        36      151   DEFINED       228
  3557  XIM1       REAL        ARRAY              REFS        17      228   DEFINED       151
    74  XIS        REAL        ARRAY   COMD       REFS        36      148   DEFINED       225
  2117  XIS1       REAL        ARRAY              REFS        16      225   DEFINED       148
     5  XMP        REAL        ARRAY   COMC       REFS        35      155   DEFINED       238
  5527  XMP1       REAL        ARRAY              REFS        17      238   DEFINED       155
    24  XMW        REAL        ARRAY   COMD       REFS        36      143   DEFINED       220
  1607  XMW1       REAL        ARRAY              REFS        15      220   DEFINED       143
     2  XOE        REAL                COMJ       REFS        41
     3  XOEX       REAL                COMJ       REFS        41
  1443  X1         REAL        ARRAY              REFS        14      217   DEFINED       140
     0  X1A        REAL        ARRAY   COMX       REFS        42
    12  Y          REAL        ARRAY   COMD       REFS        36      142   DEFINED       219
     2  YOE        REAL                COMI       REFS        40
     3  YOEX       REAL                COMI       REFS        40
  1525  Y1         REAL        ARRAY              REFS        15      219   DEFINED       142
   144  Y1A        REAL        ARRAY   COMX       REFS        42
     4  ZETA       REAL                COMJ       REFS        41  DEFINED        64
     0  ZK         REAL                COMI       REFS        40  DEFINED       201       204
     1  ZKX        REAL                COMI       REFS        40
     0  ZM         REAL                COMJ       REFS        41      263       268       278       287
                                               DEFINED        66
     1  ZMX        REAL                COMJ       REFS        41
  1336  ZQOI       REAL                           REFS       257      258   DEFINED       254
  1337  ZQOJ       REAL                           REFS       257      258   DEFINED       256
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS       REFERENCES
        GEOM                 1           137
        GRS                  5           249
        INVK                 1           245
        PRESS                3           250
        PTABLE               3            56        59
        QINTP                7           287
        TIMEB                2           160       246       251

STATEMENT LABELS            DEF LINE   REFERENCES
   104  1                      96          80        90        94
   775  2                     288         286
   674  6                     270         259
     0  7                      87          85
    70  8                      89          86
```

STATEMENT LABELS

			DEF LINE	REFERENCES					
0	9		93	91					
72	10		90	84	88				
102	11		95	92					
565	13		240	235					
0	15		104	98					
166	16		112	105	110				
317	18		157	114	153				
0	19	INACTIVE	161						
0	20	INACTIVE	139						
0	22		140	139					
0	23		144	141					
0	24		146	145					
0	25		148	147					
0	26		152	149					
0	28		156	154					
354	42		174	169	172				
353	43		173	170					
0	46	INACTIVE	163						
0	72		283	282					
0	88		181	178	179				
0	89		276	184					
0	92		217	216					
0	93		221	218					
0	94		223	222					
0	95		225	224					
0	96		229	226					
0	98		239	237					
1205	102	FMT	293	74	78	79	99	103	111
1207	103	FMT	294	106					
1212	123	FMT	295	163					
1224	124	FMT	297	165					
1227	128	FMT	298	263	268				
1245	129	FMT	301	269	280				
1265	130	FMT	304	278					
0	147		165	164					
765	200		284	177	281				
574	203		249	242					
0	217		258	253	255				
653	218		269	264	266				
0	219		275	272	273				
742	223		281	277					
0	225		280	279					

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
55	1	I	80 96	32B		NOT INNER	
62	7	J	85 87	5B	INSTACK	EXITS	
74	9	J	91 93	5B	INSTACK	EXITS	
110	15	I	98 104	27B		EXT REFS	
140	16	I	105 112	31B		EXT REFS	
172	18	I	114 157	130B		EXT REFS	NOT INNER
232	22	J	139 140	2B	INSTACK		
242	23	J	141 144	5B	INSTACK		
255	24	J	145 146	2B	INSTACK		
266	25	J	147 148	2B	INSTACK		
276	26	J	149 152	5B	INSTACK		
312	28	J	154 156	4B	INSTACK		
330	147	I	164 165	11B		EXT REFS	

```
LOOPS  LABEL   INDEX    FROM-TO    LENGTH    PROPERTIES
  356  200     II       177 284     412B               EXT REFS  NOT INNER
  357  88      J        178 181      13B               NOT INNER
  364  88      I        179 181       3B     INSTACK
  375  89      ISU      184 276     321B               EXT REFS  NOT INNER
  470  92      I        216 217       3B     INSTACK
  501  93      I        218 221       5B     INSTACK
  514  94      I        222 223       3B     INSTACK
  525  95      I        224 225       3B     INSTACK
  536  96      I        226 229       5B     INSTACK
  560  98      I        237 239       4B     INSTACK
  604  217     I        253 258      30B               NOT INNER
  622  217     J        255 258       6B     INSTACK
  645  218     I        264 269      27B               EXT REFS  NOT INNER
  656          J        269 269      12B               EXT REFS
  675  219     I        272 275      16B               NOT INNER
  703  219     J        273 275       5B     INSTACK
  721  225     I        279 280      21B               EXT REFS  NOT INNER
  724          J        280 280      12B               EXT REFS
  744  72      I        282 283      21B               EXT REFS  NOT INNER
  747          J        283 283      12B               EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       COMA         41              0 LC     (40)            40 BR     (1)
       FLUTAN       48              0 FMACH  (1)              1 BETA   (1)              2 VBO    (30)
                                   32 RVBO   (15)            47 NRVBO  (1)
       FLUTQ       205              0 QMWT   (200)          200 QMU    (5)
       COMB         12              0 ISI    (1)              1 M      (1)              2 IRR    (1)
                                    3 N      (1)              4 ISS    (1)              5 LIRR   (1)
                                    6 NO1    (1)              7 NO2    (1)              8 NMOD   (1)
                                    9 ABO    (1)             10 ALO    (1)             11 M2     (1)
       COMC         46              0 NPRES  (1)              1 NCL    (1)              2 NTEPX  (1)
                                    3 NTEPY  (1)              4 NPRD   (1)              5 XMP    (20)
                                   25 PBBO   (20)            45 BBT    (1)
       COMD        420              0 X      (10)            10 Y      (10)            20 XMW    (10)
                                   30 RBBO   (10)            40 XII    (20)            60 XIS    (60)
                                  120 ETAS   (100)          220 XIMW   (100)          320 SBBO   (100)
       COMF          4              0 MCC    (1)              1 NLRR   (1)              2 NNP    (1)
                                    3 XCP    (1)
       COMH          4              0 KQR    (1)              1 KGH    (1)              2 KFF    (1)
                                    3 NHV    (1)
       COMI          4              0 ZK     (1)              1 ZKX    (1)              2 YOE    (1)
                                    3 YOEX   (1)
       COMJ         10              0 ZM     (1)              1 ZMX    (1)              2 XOE    (1)
                                    3 XOEX   (1)              4 ZETA   (1)              5 BETAX  (1)
                                    6 RE4    (1)              7 RE4X   (1)              8 RM4    (1)
                                    9 RM4X   (1)
       COMX        200              0 X1A    (100)          100 Y1A    (100)
       CTSHF         2              0 LTSHF  (1)              1 TSHF   (1)
       CTAPES       50              0 ITAPES (50)
       COMRWP        3              0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CTABLE        8              0 KTABLE (1)              1 NPASS  (1)              2 NROWS  (1)
                                    3 NCOLS  (1)              4 NCOLST (1)              5 KTABLO (1)
                                    6 NPAGEA (1)              7 ITAPET (1)

STATISTICS
  PROGRAM LENGTH                 13177B     5759
  CM LABELED COMMON LENGTH        2041B     1057
```

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STATISTICS
     52000B CM USED
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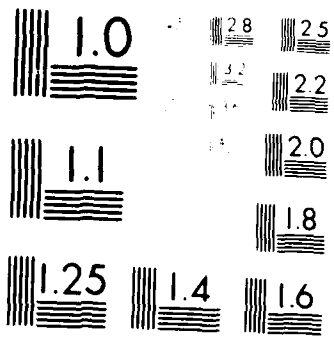
```
      SUBROUTINE GEOM(NSURF)                                            GEOM      2
C                                                                       GEOM      3
      DIMENSION        AN(1,2) ,        XAT(10) ,   DEFL(10,2)          GEOM      4
      DIMENSION        ETC(20)                                          GEOM      5
      DIMENSION      JN(4)                                              GEOM      6
      DIMENSION XLE(20)           ,XTE(20)                              GEOM      7
      DIMENSION YLE(20)           ,YTE(20)                              GEOM      8
      DIMENSION      ALPHA(100)                                         GEOM      9
      DIMENSION        CHR(100)                                         GEOM     10
      DIMENSION         HR(200)                                         GEOM     11
      DIMENSION        HCP(400)                                         GEOM     12
      DIMENSION       SLCP(400)                                         GEOM     13
      DIMENSION ITAPES(50)                                              GEOM     14
C                                                                       GEOM     15
      LOGICAL KSURF, WILK                                               GEOM     16
      COMMON/COMA/LC(40),BR                                             GEOM     17
      COMMON /COMB  / ISI,M,IRR,N,ISS,LIRR,NO1,NO2,NMOD,ABO,ALO,M2      GEOM     18
      COMMON/COMC/NPRES,NCL,NTEPX,NTEPY,NPRD,XMP(20),PBBO(20),BBT       GEOM     19
      COMMON/COMD/X(10),Y(10),XMW(10),RBBO(10),XII(20),XI(60),ETA(100), GEOM     20
     1XIMW(100),SBBO(100)                                               GEOM     21
      COMMON / CTAPES / ITAPES                                          GEOM     22
      COMMON /MODV/ XPL(400) , YPL(400) , ZPL(400)                      GEOM     23
      DATA   KERN /4HKERN/                                              GEOM     24
C                                                                       GEOM     25
C                                                                       GEOM     26
      ITAPER = ITAPES(5)                                                GEOM     27
      ITAPEW = ITAPES(6)                                                GEOM     28
      MTAP2  =  ITAPES(22)                                              GEOM     29
      MTAP8  =  ITAPES(28)                                              GEOM     30
      MTAP9  =  ITAPES(29)                                              GEOM     31
C                                                                       GEOM     32
C                                                                       GEOM     33
      NMOD  =  LC(2)                                                    GEOM     34
      WILK=.FALSE.                                                      GEOM     35
      ABO = ABO/12.0                                                    GEOM     36
      ALO = ALO/12.0                                                    GEOM     37
      WRITE (ITAPEW,102)ISI,BR,ABO,ALO,M,IRR,N,ISS                      GEOM     38
      PI=3.14159265                                                     GEOM     39
      IQS = ISS - 2*(ISS/2)                                             GEOM     40
      IRS = ISS/2 + IQS                                                 GEOM     41
      RR=IRR                                                            GEOM     42
      SS = ISS                                                          GEOM     43
      NN=NO1                                                            GEOM     44
      NN2=NO2                                                           GEOM     45
      M2 = 2*M                                                          GEOM     46
      FM = M                                                            GEOM     47
      FN = N                                                            GEOM     48
      DO 70 IR = 1,LIRR                                                 GEOM     49
      R = IR                                                            GEOM     50
   70 Y(IR) =-COS((2.0*R*PI)/(2.0*(RR+1.0)))                            GEOM     51
      DO 71 I = 1,M                                                     GEOM     52
      FI = I                                                            GEOM     53
      X(I)=-COS((2.0*FI*PI)/(2.0*FM+1.0))                               GEOM     54
   71   CONTINUE                                                        GEOM     55
      DO 72 IS = 1,ISS                                                  GEOM     56
      S = IS                                                            GEOM     57
   72 ETA(IS) =-COS((2.0*S-1.0)*PI/(2.0*SS))                            GEOM     58
```

AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2 2/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL


1.0
2.8
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

```
      IF(IQS.NE.O)ETA(IRS)=0.0                                          GEOM      59
      DO 73 J = 1,N                                                     GEOM      60
      FJ = J                                                            GEOM      61
   73 XI(J) =-COS((2.0*FJ-1.0)*PI/(2.0*FN+1.0))                         GEOM      62
C     CHORDWISE COORDINATES FOR QRS                                     GEOM      63
      DO 400 J=1,M2                                                     GEOM      64
      FJ = J                                                            GEOM      65
  400 XII(J) = -COS((2.0*FJ-1.0)*PI/(4.0*FM+1.0))                       GEOM      66
      READ (ITAPER,100) NLE,NTE                                         GEOM      67
      READ (ITAPER,118)  (XLE(I), YLE(I), I=1,NLE)                      GEOM      68
      READ (ITAPER,118)  (XTE(I), YTE(I), I=1,NTE)                      GEOM      69
      DO 8  I=1,NLE                                                     GEOM      70
    8 YLE(I) = -YLE(I)                                                  GEOM      71
      DO 9  I=1,NTE                                                     GEOM      72
    9 YTE(I) = -YTE(I)                                                  GEOM      73
      CALL WHSA (ABO,ALO,LIRR,Y,XMW,RBBO,IRS,ETA,XIMW,SBBO,             GEOM      74
     1           NLE,NTE,XLE,YLE,XTE,YTE)                               GEOM      75
      IPQ     = IRS + 1                                                 GEOM      76
      DO 82 IS =IPQ,ISS                                                 GEOM      77
      ISQ = ISS + 1 - IS                                                GEOM      78
      SBBO(IS) = SBBO(ISQ)                                              GEOM      79
   82 XIMW(IS) = XIMW(ISQ)                                              GEOM      80
      WRITE (ITAPEW,106)                                                GEOM      81
      DO 27 I=1,IRS                                                     GEOM      82
      IF(I.GT.LIRR)GO TO 28                                             GEOM      83
      WRITE (ITAPEW,107)Y(I),XMW(I),RBBO(I),ETA(I),XIMW(I),SBBO(I)      GEOM      84
      GO TO 27                                                          GEOM      85
   28 WRITE (ITAPEW,108)ETA(I),XIMW(I),SBBO(I)                          GEOM      86
   27 CONTINUE                                                          GEOM      87
      READ (ITAPER,700)KSURF                                            GEOM      88
      CALL INTP (X,Y,M,LIRR,NO1,NMOD,ABO,LP,NSURF,RBBO,XMW,             GEOM      89
     1   ALO,WILK,ALPHA,CHR,ICH,KSURF,NPOINT)                           GEOM      90
      IF(KSURF)WILK=.TRUE.                                              GEOM      91
      IF (KSURF) CALL INTP(X,Y,M,LIRR,NO1,NMOD,ABO,LP,NSURF,RBBO,       GEOM      92
     1   XMW,ALO,WILK,ALPHA,CHR,ICH,KSURF,NPOINT)                       GEOM      93
      DO 7 I=1,NMOD                                                     GEOM      94
      CALL RNRW (-MTAP9,CHR,NO1)                                        GEOM      95
      CALL RNRW (-MTAP9,ALPHA,NO1)                                      GEOM      96
      CALL RNRW (MTAP2,CHR,NO1)                                         GEOM      97
    7 CALL RNRW (MTAP2,ALPHA,NO1)                                       GEOM      98
      REWIND MTAP9                                                      GEOM      99
      REWIND MTAP8                                                      GEOM     100
   42 DO 404 K =1,NMOD                                                  GEOM     101
      CALL RNRW (-MTAP9,CHR,NO1)                                        GEOM     102
      CALL RNRW (-MTAP9,ALPHA,NO1)                                      GEOM     103
      DO 406  J=1,LIRR                                                  GEOM     104
      KK = J - 1                                                        GEOM     105
      DO 405 I = 1,M                                                    GEOM     106
      XAT(I) = RBBO(J) * ABO * X(I)                                     GEOM     107
      DEFL(I,1) = CHR(I+KK*M)                                           GEOM     108
  405 DEFL(I,2) = ALPHA(I+KK*M)                                         GEOM     109
      MQ = MINO (4,M)                                                   GEOM     110
      DO 406 I = 1,M2                                                   GEOM     111
      ARG = XII(I) * RBBO(J) * ABO                                      GEOM     112
      IF (ARG.GE.XAT(1) .AND. ARG.LE.XAT(M)) GO TO 79                   GEOM     113
      IF (ICH.EQ.1) MQ = MINO(3,M)                                      GEOM     114
      IF (ICH.GE.1) GO TO 79                                            GEOM     115
```

```
      IF (ARG.GT.XAT(M)) ARG = XAT(M)
      IF (ARG .LT.XAT(1)) ARG = XAT(1)
      CALL HELGX (ARG,AN,XAT,DEFL,M,1,MQ,1,10,1,1)
      IF (ABS(AN(1,1)) .LE. 1.0E-05) AN(1,1) = 0.
      IF (ABS(AN(1,2)) .LE. 1.0E-04) AN(1,2) = 0.
      HR(I+KK*M2) = AN(1,1) + (XII(I)*RBBO(J)*ABO - ARG) * AN(1,2)
      GO TO 406
   79 CALL HELGX (ARG,AN,XAT,DEFL,M,1,MQ,1,10,1,0)
      HR(I+KK*M2)  =  AN(1,1)
  406 CONTINUE
      CALL RNRW (MTAP2,HR,NO2)
      CALL RNRW (MTAP8,HR,NO2)
  404 CONTINUE
      REWIND MTAP8
      REWIND MTAP9
      IF (LC(24)  .EQ. 0 ) GOTO 2
      DO 44 I=1,NMOD
      KOUNT = 9
      CALL RNRW (-MTAP9,CHR,NO1)
      CALL RNRW (-MTAP9,ALPHA,NO1)
      IF(KOUNT.EQ.9)WRITE (ITAPEW,109)NSURF
   45 WRITE (ITAPEW,110)  I
      WRITE (ITAPEW,111)
      DO 50 IB=1,NN,M
      KOUNT=KOUNT + M + 1
      IF(KOUNT.LE.45)GO TO 56
      KOUNT = M + 10
      WRITE (ITAPEW,109) NSURF
      WRITE (ITAPEW,110)  I
      WRITE (ITAPEW,111)
   56 NCHORD = (IB-1)/M + 1
      YT        =  -Y(NCHORD) * ALO * 12.0
      DO 50 JB=1,M
      XT        =  (X(JB)*RBBO(NCHORD) + XMW(NCHORD) + 1.0) * ABO *12.0
      JC = (NCHORD-1)*M + JB
      IF(JB-1)51,51,52
   51 WRITE (ITAPEW,116)  YT, XT, ALPHA(JC), CHR(JC)
      GO TO 50
   52 WRITE (ITAPEW,112)  XT, ALPHA(JC), CHR(JC)
   50 CONTINUE
   44 CONTINUE
      REWIND MTAP9
      KOUNT = 7
    2 DO 5  I=1,NMOD
      CALL RNRW (-MTAP9,CHR,NO1)
      CALL RNRW (-MTAP9,ALPHA,NO1)
      INDX  =  0
      DO 4  IB = 1,NN, M
      NCHORD = (IB-1)/M + 1
      YT = -Y(NCHORD)*ALO*12.0
      DO 4  JB=1,M
      XT = (X(JB)*RBBO(NCHORD) + XMW(NCHORD) + 1.0)*ABO * 12.0
      JC = (NCHORD - 1) * M + JB
      INDX = INDX + 1
      XPL(INDX) = XT
      YPL(INDX) = YT
      ZPL(INDX) = 0.
```

```
            HCP(INDX) = CHR(JC)                                         GEOM   173
            SLCP(INDX) = ALPHA(JC)                                      GEOM   174
    4     CONTINUE                                                      GEOM   175
C           PLOT DEFLECTIONS AND SLOPES                                 GEOM   176
            CALL MOVIS (NSURF,I    ,2,INDX,1,KERN,HCP)                  GEOM   177
            CALL MOVIS (NSURF,I    ,3,INDX,1,KERN,SLCP)                 GEOM   178
    5     CONTINUE                                                      GEOM   179
          REWIND MTAP9                                                  GEOM   180
          IF (LC(24) .EQ. 0) GOTO 1                                     GEOM   181
          DO 47  I=1,NMOD                                               GEOM   182
          CALL RNRW (-MTAP8,HR,NO2)                                     GEOM   183
          IF(KOUNT.EQ.7)WRITE (ITAPEW,113)NSURF                         GEOM   184
          WRITE (ITAPEW,114)  I                                         GEOM   185
          DO 53 IK=1,NN2,M2                                             GEOM   186
          KOUNT = KOUNT + M2 + 1                                        GEOM   187
          IF(KOUNT.LE.45)GO TO 57                                       GEOM   188
          WRITE (ITAPEW,113) NSURF                                      GEOM   189
          WRITE (ITAPEW,114)  I                                         GEOM   190
          KOUNT = M2 + 8                                                GEOM   191
   57     NCHORD = (IK-1)/M2 + 1                                        GEOM   192
          YT         =  -Y(NCHORD) * ALO * 12.0                         GEOM   193
          DO 53 IG=1,M2                                                 GEOM   194
          XT         =  (XII(IG)*RBBO(NCHORD) + XMW(NCHORD) + 1.0)*ABO*12.0  GEOM   195
          JC = (NCHORD-1)*M2 + IG                                       GEOM   196
          IF(IG-1)54,54,55                                              GEOM   197
   54     WRITE (ITAPEW,117) YT, XT, HR(JC)                             GEOM   198
          GO TO 53                                                      GEOM   199
   55     WRITE (ITAPEW,115)     XT, HR(JC)                             GEOM   200
   53     CONTINUE                                                      GEOM   201
   47     CONTINUE                                                      GEOM   202
          REWIND MTAP8                                                  GEOM   203
    1     IF ( NPRD .EQ. 0 )       GO TO 60                             GEOM   204
          KK=NTEPY                                                      GEOM   205
          AKK=KK                                                        GEOM   206
          STEPY=1.0/AKK                                                 GEOM   207
          DO 61 I=1,KK                                                  GEOM   208
          IF(I.EQ.1)ETC(I) =0.0                                         GEOM   209
          IF(I.GT.1)ETC(I)=ETC(I-1)-STEPY                               GEOM   210
   61     CONTINUE                                                      GEOM   211
          CALL WHSA (ABO,ALO,KK,ETC,XMP,PBBO,O,Z1,Z2,Z3,                GEOM   212
         1          NLE,NTE,XLE,YLE,XTE,YTE)                            GEOM   213
C                                                                       GEOM   214
C                                                                       GEOM   215
C FORMATS                                                               GEOM   216
C                                                                       GEOM   217
  100     FORMAT(10I5)                                                  GEOM   218
  102     FORMAT (1H1,4X14HSURFACE NO. = ,I5,5X22HREF. SEMI-CHORD(FT) = ,  GEOM   219
         1        1PE10.3/5X22HROOT SEMI-CHORD(FT) = ,1PE10.3,5X        GEOM   220
         2        16HSEMI-SPAN(FT) = ,1PE10.3/5X                        GEOM   221
         3        24HNO CHORDWISE COLL PTS = ,I5,5X                     GEOM   222
         4        23HNO SPANWISE COLL PTS = ,I5/5X                      GEOM   223
         5        23HNO CHORDWISE INT PTS = ,I5,5X                      GEOM   224
         6        22HNO SPANWISE INT PTS = ,I5//)                       GEOM   225
  106     FORMAT (1H ,25X27HNON-DIMENSIONAL COORDINATES,/8X             GEOM   226
         1        18HCOLLOCATION POINTS,20X18HINTEGRATION POINTS,/7X    GEOM   227
         2        6HY/L(O),4X6HX/B(O),4X6HB/B(O),8X8HETA/L(O),3X7HXI/B(O),  GEOM   228
         3        3X6HB/B(O),/13X11H(MID-CHORD),25X11H(MID-CHORD),/)    GEOM   229
```

```
          107 FORMAT(2(5X,1P3E10.3))
          108 FORMAT(40X,1P3E10.3)
          109 FORMAT (1H1,4X34HMODE SHAPES FOR COLLOCATION POINTS. //
            1         10X17HSURFACE NUMBER = ,I3)
          110 FORMAT (/10X11HCOORDINATES,13X7HMODE = , I5,/)
          111 FORMAT (6X5HY(IN),8X5HX(IN),7X5HALPHA,9X2HHR,/)
          112 FORMAT (13X,3(3X,1PE10.3))
          113 FORMAT (1H1,4X38HMODE SHAPES FOR GENERALIZED AIR FORCES. //
            1         10X17HSURFACE NUMBER = ,I3)
          114 FORMAT (/6X5HY(IN),7X5HX(IN),5X7HMODE = ,I3 /)
          115 FORMAT (13X,2(3X,1PE10.3))
          116 FORMAT (/4(3X,1PE10.3))
          117 FORMAT (/3(3X,1PE10.3))
          118 FORMAT(6E10.3)
          700 FORMAT(L5)
       C
           60 RETURN
              END
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE      REFERENCES
   3  GEOM           1           245

VARIABLES      SN  TYPE               RELOCATION
   11  ABO         REAL                      COMB     REFS       17      35      37      73      88      91     106
                                                        111     120     148     166     194     211
                                                    DEFINED      35
 1573  AKK         REAL                               REFS      206  DEFINED     205
 2010  ALPHA       REAL          ARRAY                REFS        8      88      91      95      97     102     108
                                                        134     151     153     160     173
   12  ALO         REAL                      COMB     REFS       17      36      37      73      88      91     146
                                                        164     192     211  DEFINED      36
 1600  AN          REAL          ARRAY                REFS        3     117     118     119   2*120     122     123
                                                    DEFINED     118     119
 1560  ARG         REAL                               REFS    2*112     115     116     117     120     122
                                                    DEFINED     111     115     116
   55  BBT         REAL                      COMC     REFS       18
   50  BR          REAL                      COMA     REFS       16      37
 2154  CHR         REAL          ARRAY                REFS        9      88      91      94      96     101     107
                                                        133     151     153     159     172
 1614  DEFL        REAL          ARRAY                REFS        3     117     122  DEFINED     107     108
  170  ETA         REAL          ARRAY       COMD     REFS       19      73      83      85  DEFINED      57      58
 1640  ETC         REAL          ARRAY                REFS        4     209     211  DEFINED     208     209
 1541  FI          REAL                               REFS       53  DEFINED      52
 1545  FJ          REAL                               REFS       61      65  DEFINED      60      64
 1534  FM          REAL                               REFS       53      65  DEFINED      46
 1535  FN          REAL                               REFS       61  DEFINED      47
 2630  HCP         REAL          ARRAY                REFS       11     176  DEFINED     172
 2320  HR          REAL          ARRAY                REFS       10     125     126     182     197     199
                                                    DEFINED     120     123
 1540  I           INTEGER                            REFS       52      53    2*67    2*68    2*70    2*72      82
                                                       6*83    3*85   2*106   2*107   2*108     111   2*120     123
```

```
 VARIABLES      SN  TYPE           RELOCATION
                                                 136       143       176       177       184       189     2*208     3*209
                                             DEFINED        51        67        68        69        71        81        93
                                                 105       110       131       158       181       207
  1562  IB          INTEGER                     REFS       145       163   DEFINED       138       162
  1553  ICH         INTEGER                     REFS        88        91       113       114
  1572  IG          INTEGER                     REFS       194       195       196   DEFINED       193
  1571  IK          INTEGER                     REFS       191   DEFINED       185
  1570  INDX        INTEGER                     REFS       168       169       170       171       172       173       176
                                                 177   DEFINED       161       168
  1550  IPQ         INTEGER                     REFS        76   DEFINED        75
  1526  IQS         INTEGER                     REFS        40        58   DEFINED        39
  1536  IR          INTEGER                     REFS        49        50   DEFINED        48
     2  IRR         INTEGER          COMB       REFS        17        37        41
  1527  IRS         INTEGER                     REFS        58        73        75        81   DEFINED        40
  1542  IS          INTEGER                     REFS        56        57        77        78        79
                                             DEFINED        55        76
     0  ISI         INTEGER          COMB       REFS        17        37
  1551  ISQ         INTEGER                     REFS        78        79   DEFINED        77
     4  ISS         INTEGER          COMB       REFS        17        37      2*39        40        42        55        76
                                                  77
  1520  ITAPER      INTEGER                  DEFINED        26  I/O REFS        66        67        68        87
     0  ITAPES      INTEGER  ARRAY   CTAPES     REFS        13        21        26        27        28        29        30
  1521  ITAPEW      INTEGER                  DEFINED        27  I/O REFS        37        80        83        85       135
                                                 136       137       142       143       144       151       153       183
                                                 184       188       189       197       199
  1544  J           INTEGER                     REFS        60        61        64        65       104       106       111
                                                 120   DEFINED        59        63       103
  1565  JB          INTEGER                     REFS       148       149       150       166       167
                                             DEFINED       147       165
  1567  JC          INTEGER                     REFS     2*151     2*153       172       173       197       199
                                             DEFINED       149       167       195
  1664  JN          INTEGER  *UNDEF             REFS         5
  1555  K         * INTEGER                  DEFINED       100
  1134  KERN        INTEGER                     REFS       176       177   DEFINED        23
  1556  KK          INTEGER                     REFS       107       108       120       123       205       207       211
                                             DEFINED       104       204
  1561  KOUNT       INTEGER                     REFS       135       139       140       183       186       187
                                             DEFINED       132       139       141       157       186       190
  1516  KSURF       LOGICAL                     REFS        15        88        90      2*91   DEFINED        87
     0  LC          INTEGER  ARRAY   COMA       REFS        16        33       130       180
     5  LIRR        INTEGER          COMB       REFS        17        48        73        82        88        91       103
  1552  LP          INTEGER                     REFS        88        91
     1  M           INTEGER          COMB       REFS        17        37        45        46        51        88        91
                                                 105       107       108       109       112       113     2*115       117
                                                 122       138       139       141       145       147       149       162
                                                 163       165       167
  1557  MQ          INTEGER                     REFS       117       122   DEFINED       109       113
  1522  MTAP2       INTEGER                     REFS        96        97       125   DEFINED        28
  1523  MTAP8       INTEGER                     REFS       126       182   DEFINED        29  I/O REFS        99       128
                                                 202
  1524  MTAP9       INTEGER                     REFS        94        95       101       102       133       134       159
                                                 160   DEFINED        30  I/O REFS        98       129       156       179
    13  M2          INTEGER          COMB       REFS        17        63       110       120       123       185       186
                                                 190       191       193       195   DEFINED        45
     3  N           INTEGER          COMB       REFS        17        37        47        59
  1563  NCHORD      INTEGER                     REFS       146     2*148       149       164     2*166       167       192
                                               2*194       195   DEFINED       145       163       191
```

```
VARIABLES      SN  TYPE                RELOCATION
     1  NCL        INTEGER                  COMC     REFS       18
  1546  NLE        INTEGER                           REFS       67       69       73      211  DEFINED       66
    10  NMOD       INTEGER                  COMB     REFS       17       88       91       93      100      131      158
                                                      181  DEFINED       33
  1532  NN         INTEGER                           REFS      138      162  DEFINED       43
  1533  NN2        INTEGER                           REFS      185  DEFINED       44
     6  NO1        INTEGER                  COMB     REFS       17       43       88       91       94       95       96
                                                       97      101      102      133      134      159      160
     7  NO2        INTEGER                  COMB     REFS       17       44      125      126      182
  1554  NPOINT     INTEGER                           REFS       88       91
     4  NPRD       INTEGER                  COMC     REFS       18      203
     0  NPRES      INTEGER                  COMC     REFS       18
     0  NSURF      INTEGER                  F.P.     REFS       88       91      135      142      176      177      183
                                                      188  DEFINED        1
  1547  NTE        INTEGER                           REFS       68       71       73      211  DEFINED       66
     2  NTEPX      INTEGER                  COMC     REFS       18
     3  NTEPY      INTEGER                  COMC     REFS       18      204
    31  PBBO       REAL           ARRAY     COMC     REFS       18      211
  1525  PI         REAL                              REFS       50       53       57       61       65
                                                  DEFINED       38
  1537  R          REAL                              REFS       50  DEFINED       49
    36  RBBO       REAL           ARRAY     COMD     REFS       19       73       83       88       91      106      111
                                                      120      148      166      194
  1530  RR         REAL                              REFS       50  DEFINED       41
  1543  S          REAL                              REFS       57  DEFINED       56
   500  SBBO       REAL           ARRAY     COMD     REFS       19       73       78       83       85
                                                  DEFINED       78
  3450  SLCP       REAL           ARRAY              REFS       12      177  DEFINED      173
  1531  SS         REAL                              REFS       57  DEFINED       42
  1574  STEPY      REAL                              REFS      209  DEFINED      206
  1517  WILK       LOGICAL                           REFS       15       88       91  DEFINED       34       90
     0  X          REAL           ARRAY     COMD     REFS       19       88       91      106      148      166
                                                  DEFINED       53
  1602  XAT        REAL           ARRAY              REFS        3    2*112    2*115    2*116      117      122
                                                  DEFINED      106
    74  XI         REAL           ARRAY     COMD     REFS       19  DEFINED       61
    50  XII        REAL           ARRAY     COMD     REFS       19      111      120      194  DEFINED       65
   334  XIMW       REAL           ARRAY     COMD     REFS       19       73       79       83       85
                                                  DEFINED       79
  1670  XLE        REAL           ARRAY              REFS        6       73      211  DEFINED       67
     5  XMP        REAL           ARRAY     COMC     REFS       18      211
    24  XMW        REAL           ARRAY     COMD     REFS       19       73       83       88       91      148      166
                                                      194
     0  XPL        REAL           ARRAY     MODV     REFS       22  DEFINED      169
  1566  XT         REAL                              REFS      151      153      169      197      199
                                                  DEFINED      148      166      194
  1714  XTE        REAL           ARRAY              REFS        6       73      211  DEFINED       68
    12  Y          REAL           ARRAY     COMD     REFS       19       73       83       88       91      146      164
                                                      192  DEFINED       50
  1740  YLE        REAL           ARRAY              REFS        7       70       73      211  DEFINED       67       70
   620  YPL        REAL           ARRAY     MODV     REFS       22  DEFINED      170
  1564  YT         REAL                              REFS      151      170      197  DEFINED      146      164      192
  1764  YTE        REAL           ARRAY              REFS        7       72       73      211  DEFINED       68       72
  1440  ZPL        REAL           ARRAY     MODV     REFS       22  DEFINED      171
  1575  Z1       * REAL                              REFS      211
  1576  Z2       * REAL                              REFS      211
  1577  Z3       * REAL                              REFS      211
```

```
VARIABLES      SN  TYPE           RELOCATION
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS        REFERENCES
       COS         REAL       1 LIBRARY     50        53        57        61        65
       HELGX                 11            117       122
       INTP                  18             88        91
       MOVIS                  7            176       177
       RNRW                   3             94        95        96        97       101       102       125       126       133
                                           134       159       160       182
       WHSA                  16             73       211

INLINE FUNCTIONS    TYPE   ARGS        DEF LINE  REFERENCES
       ABS         REAL       1  INTRIN            118       119
       MINO        INTEGER    0  INTRIN            109       113

STATEMENT LABELS               DEF LINE   REFERENCES
  715   1                         203        180
  536   2                         158        130
    0   4                         174        162       165
    0   5                         178        158
    0   7                          97         93
    0   8                          70         69
    0   9                          72         71
  243  27                          86         81        84
  234  28                          85         82
    0  42          INACTIVE       100
    0  44                         155        131
    0  45          INACTIVE       136
    0  47                         201        181
  523  50                         154        138       147       152
    0  51          INACTIVE       151      2*150
  515  52                         153        150
  703  53                         200        185       193       198
    0  54          INACTIVE       197      2*196
  676  55                         199        196
  465  56                         145        140
  647  57                         191        187
  737  60                         245        203
    0  61                         210        207
    0  70                          50         48
    0  71                          54         51
    0  72                          57         55
    0  73                          61         59
  403  79                         122        112       114
    0  82                          79         76
 1332  100      FMT               217         66
 1334  102      FMT               218         37
 1367  106      FMT               225         80
 1413  107      FMT               229         83
 1416  108      FMT               230         85
 1421  109      FMT               231        135       142
 1432  110      FMT               233        136       143
 1437  111      FMT               234        137       144
 1444  112      FMT               235        153
 1447  113      FMT               236        183       188
 1460  114      FMT               238        184       189
 1465  115      FMT               239        199
```

```
STATEMENT LABELS            DEF LINE   REFERENCES
 1470  116      FMT            240        151
 1473  117      FMT            241        197
 1476  118      FMT            242         67        68
    0  400                      65         63
    0  404                     127        100
    0  405                     108        105
  411  406                     124        103       110       121
 1500  700      FMT            243         87

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   43  70       IR          48 50        12B              EXT REFS
   56  71       I           51 54        11B              EXT REFS
   70  72       IS          55 57        11B              EXT REFS
  104  73       J           59 61        12B              EXT REFS
  117  400      J           63 65        12B              EXT REFS
  135           I           67 67        10B              EXT REFS
  151           I           68 68        10B              EXT REFS
  165  8        I           69 70         2B     INSTACK
  173  9        I           71 72         2B     INSTACK
  206  82       IS          76 79         5B     INSTACK
  216  27       I           81 86        30B              EXT REFS
  261  7        I           93 97        15B              EXT REFS
  302  404      K          100 127      123B              EXT REFS  NOT INNER
  311  406      J          103 124      105B              EXT REFS  NOT INNER
  321  405      I          105 108        6B     INSTACK
  334  406      I          110 124       60B              EXT REFS
  432  44       I          131 155      101B              EXT REFS  NOT INNER
  452  50       IB         138 154       57B              EXT REFS  NOT INNER
  475  50       JB         147 154       31B              EXT REFS
  537  5        I          158 178       61B              EXT REFS  NOT INNER
  547  1        IB         162 174       41B              NOT INNER
  566  4        JB         165 174       15B       OPT
  623  47       I          181 201       70B              EXT REFS  NOT INNER
  635  53       IK         185 200       54B              EXT REFS  NOT INNER
  657  53       IG         193 200       27B              EXT REFS
  726  61       I          207 210        7B     INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
      COMA          41              0 LC      (40)            40 BR      (1)
      COMB          12              0 ISI     (1)              1 M       (1)            2 IRR     (1)
                                    3 N       (1)              4 ISS     (1)            5 LIRR    (1)
                                    6 NO1     (1)              7 NO2     (1)            8 NMOD    (1)
                                    9 ABO     (1)             10 ALO     (1)           11 M2      (1)
      COMC          46              0 NPRES   (1)              1 NCL     (1)            2 NTEPX   (1)
                                    3 NTEPY   (1)              4 NPRD    (1)            5 XMP     (20)
                                   25 PBBO    (20)            45 BBT     (1)
      COMD         420              0 X       (10)            10 Y       (10)          20 XMW     (10)
                                   30 RBBO    (10)            40 XII     (20)          60 XI      (60)
                                  120 ETA     (100)          220 XIMW    (100)        320 SBBO    (100)
      CTAPES        50              0 ITAPES  (50)
      MODV        1200              0 XPL     (400)          400 YPL     (400)        800 ZPL     (400)

STATISTICS
  PROGRAM LENGTH               4273B     2235
  CM LABELED COMMON LENGTH     3351B     1769
        52000B CM USED
```

```
                SUBROUTINE WHSA (ABO,ALO,LIRR,Y,XMW,RBBO,IRS,ETA,XIMW,SBBO,       WHSA    2
               1                   NLE,NTE,XLE,YLE,XTE,YTE)                       WHSA    3
                DIMENSION XLE(1)          ,XTE(1)                                 WHSA    4
                DIMENSION YLE(1)          ,YTE(1)                                 WHSA    5
                DIMENSION XIMW(1)         ,XMW(1)                                 WHSA    6
                DIMENSION RBBO(1)                                                 WHSA    7
                DIMENSION SBBO(1)                                                 WHSA    8
                DIMENSION Y(1)                                                    WHSA    9
                DIMENSION DYLE(20),DXLE(20),DYTE(20),DXTE(20)                     WHSA   10
                DIMENSION ETA(1)                                                  WHSA   11
          C     NORMALIZE                                                         WHSA   12
                DO 301 I=1,NLE                                                    WHSA   13
                DYLE(I)=YLE(I)/(12.*ALO)                                          WHSA   14
            301 DXLE(I)=(XLE(I)/(12.*ABO))-1.                                     WHSA   15
                DO 302 I=1,NTE                                                    WHSA   16
                DYTE(I)=YTE(I)/(12.*ALO)                                          WHSA   17
            302 DXTE(I)=(XTE(I)/(12.*ABO))-1.                                     WHSA   18
                DO 303 I = 1,LIRR                                                 WHSA   19
                CALL XTEXLE(DXLE,DYLE,DXTE,DYTE,Y,XATYLE,XATYTE,I,NLE,NTE)        WHSA   20
                XMW(I) = ((XATYLE + XATYTE)/2.)                                   WHSA   21
            303 RBBO (I) = ((XATYTE - XATYLE)/2.)                                 WHSA   22
                IF(IRS.LT.1) GO TO 2                                              WHSA   23
                DO 304 I = 1,IRS                                                  WHSA   24
                CALL XTEXLE(DXLE,DYLE,DXTE,DYTE,ETA,XATYLE,XATYTE,I,NLE,NTE)      WHSA   25
                XIMW (I) = ((XATYLE + XATYTE)/2.)                                 WHSA   26
            304 SBBO (I) = ((XATYTE - XATYLE) /2.)                                WHSA   27
              2 CONTINUE                                                          WHSA   28
                RETURN                                                            WHSA   29
                END                                                               WHSA   30
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  WHSA          1           28

VARIABLES      SN  TYPE              RELOCATION
     0  ABO        REAL                   F.P.     REFS       14      17   DEFINED       1
     0  ALO        REAL                   F.P.     REFS       13      16   DEFINED       1
   164  DXLE       REAL        ARRAY               REFS        9      19        24  DEFINED    14
   234  DXTE       REAL        ARRAY               REFS        9      19        24  DEFINED    17
   140  DYLE       REAL        ARRAY               REFS        9      19        24  DEFINED    13
   210  DYTE       REAL        ARRAY               REFS        9      19        24  DEFINED    16
     0  ETA        REAL        ARRAY      F.P.     REFS       10      24   DEFINED       1
   135  I          INTEGER                         REFS     2*13    2*14      2*16    2*17    19    20    21
                                                     24       25      26   DEFINED      12    15    18    23
     0  IRS        INTEGER                F.P.     REFS       22      23   DEFINED       1
     0  LIRR       INTEGER                F.P.     REFS       18  DEFINED          1
     0  NLE        INTEGER                F.P.     REFS       12      19        24  DEFINED     1
     0  NTE        INTEGER                F.P.     REFS       15      19        24  DEFINED     1
     0  RBBO       REAL        ARRAY      F.P.     REFS        6  DEFINED          1      21
     0  SBBO       REAL        ARRAY      F.P.     REFS        7  DEFINED          1      26
   136  XATYLE     REAL                            REFS       19      20        21      24    25    26
   137  XATYTE     REAL                            REFS       19      20        21      24    25    26
```

```
VARIABLES      SN  TYPE           RELOCATION
    O  XIMW       REAL       ARRAY     F.P.        REFS        5   DEFINED        1        25
    O  XLE        REAL       ARRAY     F.P.        REFS        3        14   DEFINED        1
    O  XMW        REAL       ARRAY     F.P.        REFS        5   DEFINED        1        20
    O  XTE        REAL       ARRAY     F.P.        REFS        3        17   DEFINED        1
    O  Y          REAL       ARRAY     F.P.        REFS        8        19   DEFINED        1
    O  YLE        REAL       ARRAY     F.P.        REFS        4        13   DEFINED        1
    O  YTE        REAL       ARRAY     F.P.        REFS        4        16   DEFINED        1

EXTERNALS           TYPE   ARGS        REFERENCES
       XTEXLE               10             19       24

STATEMENT LABELS              DEF LINE   REFERENCES
  100  2                          27         22
    O  301                        14         12
    O  302                        17         15
    O  303                        21         18
    O  304                        26         23

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   17  301      I           12 14        6B      INSTACK
   36  302      I           15 17        6B      INSTACK
   46  303      I           18 21       14B               EXT REFS
   64  304      I           23 26       14B               EXT REFS

STATISTICS
  PROGRAM LENGTH                275B     189
        52000B CM USED
```

```
                SUBROUTINE XTEXLE(XLE,YLE,XTE,YTE,Y,XATYLE,XATYTE,I,NLE,NTE)      XTEXLE      2
                DIMENSION XLE(1)            ,XTE(1)                               XTEXLE      3
                DIMENSION Y(1)              ,YLE(1)             ,YTE(1)           XTEXLE      4
                AY = ABS(Y(I))                                                    XTEXLE      5
                DO 304  I1= 2,NLE                                                 XTEXLE      6
                AYLE = ABS(YLE(I1))                                               XTEXLE      7
                IF (AYLE-AY)  304,305,305                                         XTEXLE      8
            304 CONTINUE                                                          XTEXLE      9
        C         APPROXIMATE LOCATION ON LEADING EDGE FOUND                      XTEXLE     10
            305 DO 306 I2 = 2,NTE                                                 XTEXLE     11
                AYTE = ABS (YTE(I2))                                              XTEXLE     12
                IF (AYTE - AY) 306,307,307                                        XTEXLE     13
            306 CONTINUE                                                          XTEXLE     14
        C         CHECK TO SEE IF Y  COINCIDES WITH ANY OF END-POINTS             XTEXLE     15
            307 IF (AY - ABS(YLE(I1-1))) 308,309,308                              XTEXLE     16
            308 IF (AY - AYLE)  314,311,314                                       XTEXLE     17
            310 IF (AY - ABS(YTE(I2-1))) 312,313,312                              XTEXLE     18
            312 IF (AY - AYTE) 316,315,316                                        XTEXLE     19
            309 XATYLE = XLE(I1-1)                                                XTEXLE     20
                GO TO 310                                                         XTEXLE     21
            311 XATYLE = XLE(I1)                                                  XTEXLE     22
                GO TO 310                                                         XTEXLE     23
            313 XATYTE = XTE(I2-1)                                                XTEXLE     24
                GO TO 317                                                         XTEXLE     25
            315 XATYTE = XTE(I2)                                                  XTEXLE     26
                GO TO 317                                                         XTEXLE     27
        C       INTERPOLATE FOR X ON TRAILING & LEADING EDGES                     XTEXLE     28
            314 SLOLE = (XLE(I1) - XLE(I1-1))/(YLE(I1) - YLE(I1-1))               XTEXLE     29
                XATYLE = XLE(I1-1) + SLOLE*(Y(I) - YLE(I1-1))                     XTEXLE     30
                GO TO 310                                                         XTEXLE     31
            316 SLOTE =  (XTE(I2) - XTE(I2-1))/(YTE(I2) - YTE(I2-1))              XTEXLE     32
                XATYTE = XTE(I2-1) + SLOTE*(Y(I) - YTE(I2-1))                     XTEXLE     33
            317 RETURN                                                            XTEXLE     34
                END                                                               XTEXLE     35
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 XTEXLE	1	33

VARIABLES	SN	TYPE	RELOCATION							
113	AY	REAL		REFS	7	12	15	16	17	18
				DEFINED	4					
115	AYLE	REAL		REFS	7	16	DEFINED	6		
117	AYTE	REAL		REFS	12	18	DEFINED	11		
0	I	INTEGER	F.P.	REFS	4	29	32	DEFINED	1	
114	I1	INTEGER		REFS	6	15	19	21	4*28	2*29
				DEFINED	5					
116	I2	INTEGER		REFS	11	17	23	25	4*31	2*32
				DEFINED	10					
0	NLE	INTEGER	F.P.	REFS	5	DEFINED	1			
0	NTE	INTEGER	F.P.	REFS	10	DEFINED	1			
120	SLOLE	REAL		REFS	29	DEFINED	28			

```
VARIABLES      SN  TYPE            RELOCATION
   121  SLOTE      REAL                            REFS       32    DEFINED      31
     O  XATYLE     REAL                     F P    DEFINED     1       19        21        29
     O  XATYTE     REAL                     F P.   DEFINED     1       23        25        32
     O  XLE        REAL        ARRAY        F P      REFS      2       19        21        2*28      29
                                                   DEFINED     1
     O  XTE        REAL        ARRAY        F P.     REFS      2       23        25        2*31      32
                                                   DEFINED     1
     O  Y          REAL        ARRAY        F P.     REFS      3        4        29        32     DEFINED     1
     O  YLE        REAL        ARRAY        F.P.     REFS      3        6        15        2*28      29
                                                   DEFINED     1
     O  YTE        REAL        ARRAY        F.P.     REFS      3       11        17        2*31      32
                                                   DEFINED     1

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
        ABS         REAL      1  INTRIN                4          6        11        15        17

STATEMENT LABELS               DEF LINE    REFERENCES
     O  304                       8          5         7
    22  305                      10         2*7
     O  306                      13         10        12
    32  307                      15         2*12
     O  308         INACTIVE     16         2*15
    50  309                      19         15
    41  310                      17         20        22        30
    53  311                      21         16
     O  312         INACTIVE     18         2*17
    56  313                      23         17
    66  314                      28         2*16
    62  315                      25         18
   100  316                      31         2*18
   112  317                      33         24        26

LOOPS   LABEL     INDEX       FROM-TO      LENGTH     PROPERTIES
    13  304       I1            5 8           7B        INSTACK     EXITS
    23  306       I2           10 13          7B        INSTACK     EXITS

STATISTICS
  PROGRAM LENGTH                 127B       87
          52000B CM USED
```

```
      GO TO (5,5,5,5,8),M                                               INVK  59
    8 F1(5) =-SA*XSQ*XSQ*XSQ*(X(I)*X(I)+2.0/3.0)/5.0                    INVK  60
    5 DO 9 KK =1,M                                                      INVK  61
      F2R(KK) =0.0                                                      INVK  62
    9 F2I(KK) =0.0                                                      INVK  63
      IF (ZK) 10,10,11                                                  INVK  64
   11 NO =ZK*RBBO(K)*(1.0+X(I))*2.0/PI                                  INVK  65
      NIN =2 + (M+NO)/2                                                 INVK  66
      ANIN =2*NIN + 1                                                   INVK  67
      C22 =C2/ANIN                                                      INVK  68
      DO 12 J=1,NIN                                                     INVK  69
      AJ =J                                                             INVK  70
      XX =(X(I)-1.0-(X(I)+1.0)*COS((2.0*AJ-1.0)*PI/ANIN))/2.0           INVK  71
      XOZ =RBBO(K)*(X(I)-XX)                                            INVK  72
      COF =COS(ZK*XOZ) - 1.0                                            INVK  73
      SIF =-SIN(ZK*XOZ)                                                 INVK  74
      CAF =SQRT((X(I)-XX)*(1.0-XX))*C22                                 INVK  75
      F2R(1) = F2R(1) + CAF*COF                                         INVK  76
      F2I(1) = F2I(1) + CAF*SIF                                         INVK  77
      CAF =CAF*(1.0+XX)                                                 INVK  78
      F2R(2) = F2R(2) + CAF*COF                                         INVK  79
      F2I(2) = F2I(2) + CAF*SIF                                         INVK  80
      GO TO (12,12,14,14,14),M                                          INVK  81
   14 DO 15 JJ =3,M                                                     INVK  82
      CAF =CAF*XX                                                       INVK  83
      F2R(JJ) = F2R(JJ) + CAF*COF                                       INVK  84
   15 F2I(JJ) = F2I(JJ) + CAF*SIF                                       INVK  85
   12 CONTINUE                                                          INVK  86
   10 DO 16 L1 =1,M                                                     INVK  87
      DO 16 M1 =1,LIRR                                                  INVK  88
      F3R(L1,M1) = 0.0                                                  INVK  89
   16 F3I(L1,M1) = 0.0                                                  INVK  90
      DO 17 IS =1,ISS                                                   INVK  91
      YOW = ALOB*(Y(K)-ETA(IS))                                         INVK  92
      YOW2=YOW*YOW                                                      INVK  93
      IF (ZK) 18,18,19                                                  INVK  94
   18 CONTINUE                                                          INVK  95
      GO TO 20                                                          INVK  96
   19 CALL CONA(RE1,RI2,RI3)                                            INVK  97
   20 C3 = C1*(1.0-ETA(IS)*ETA(IS))                                     INVK  98
      DO 17 IN =1,N                                                     INVK  99
      XOW = RBBO(K)*X(I)-SBBO(IS)*XI(IN)+XMW(K)-XIMW(IS)                INVK 100
      XOW2=XOW*XOW                                                      INVK 101
      R1=SQRT(XOW*XOW+YOW*YOW)                                          INVK 102
      IF(R1.GE.R)GO TO 100                                              INVK 103
      IBX=I                                                             INVK 104
      IBY=K                                                             INVK 105
      IBXI=IN                                                           INVK 106
      IBET=IS                                                           INVK 107
      R=R1                                                              INVK 108
  100 CONTINUE                                                          INVK 109
      IF (ZK) 21,21,22                                                  INVK 110
   21 CONTINUE                                                          INVK 111
      XYB = SQRT(XOW2+BETA2*YOW2)                                       INVK 112
      AXKR=-1.0/YOW2*(1.0+XOW/XYB)                                      INVK 113
      AXKI = 0.0                                                        INVK 114
      GO TO 23                                                          INVK 115
```

```
      SUBROUTINE INVK(IND )
C
C     KERNEL FUNCTION ANALYSIS - A MATRIX INVERSION
      DIMENSION     F1(5),         F2R(5),          F2I(5)
      DIMENSION  F3R(5,5),       F3I(5,5)
      DIMENSION  AIC(100,25)
      DIMENSION ITAPES(50)
      COMMON /COMA/ LC(40) , BR
      COMMON /COMB  / ISI,MA,IRR,N,ISS,LIRA,NO1,NO2,NMOD,ABO,ALO,M2
      COMMON/COMD/X(10),Y(10),XMW(10),RBBO(10),XII(20),XI(60),ETA(100),
     1XIMW(100),SBBO(100)
      COMMON/COMF/MCC,NLRR,NNP,Z1A
      COMMON/COMH/KQR,KGH,KKF,NHV
      COMMON/COMI/ZK,ZKX,YOW,YOWX
      COMMON/COMJ/ZM,ZMX,XOW,XOWX,BETA,BETAX,RE4,RE4X,RM4,RM4X
      COMMON / CTAPES / ITAPES
      COMPLEX              AIC
C
C
      ITAPEW = ITAPES(6)
      MTAP10 = ITAPES(30)
C
C
      NMOD  =  LC(2)
      R=1.0
      IBX=1
      IBY=1
      IBXI=1
      IBET=1
      NN = NO1
      IF (LC(7).EQ.-1.OR.LC(7).EQ.2)  ZK = O.
      ALOB - ALO/ABO
      ALOB2 = ALOB*ALOB
      PI = 3.14159265
      BETAX = 0.0
      BETA2 = BETA*BETA
      FN = N
      SS = ISS
      MAM = MA
      JIRR = LIRA
      M = MCC
      LIRR = NLRR
      C1 =2.0*PI*ALOB2/((2.0*FN+1.0)*SS)
      C2 =4.0*PI
      LINE = 0
      DO 4 K=1,JIRR
      DO 4 I =1,MAM
      XSQ = SQRT(1.0-X(I)*X(I))
      TANG = X(I)/XSQ
      ANGLE = ATAN(TANG)
      SA =2.0
      F1(1) = SA*(XSQ+ANGLE+0.5*PI)
      F1(2) = SA*(X(I)*XSQ+ANGLE+0.5 *PI)/2.0
      GO TO (5,5,6,6,6),M
    6 F1(3) =-SA*XSQ*XSQ*XSQ/3.0
      GO TO (5,5,5,7,7),M
    7 F1(4) = SA*(X(I)*XSQ*(-XSQ*XSQ+0.5)+0.5*ANGLE+0.25*PI)/4.0
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                  DEFINED      22
  104  ITAPER    INTEGER                          DEFINED      11    I/O REFS     18
    0  ITAPES    INTEGER     ARRAY     CTAPES       REFS        5         6       11         12
  105  ITAPEW    INTEGER                          DEFINED      12    I/O REFS     19
  112  J         INTEGER                            REFS     2*30      2*31   DEFINED        29
    0  KEL       INTEGER                 F.P.     DEFINED       1        20
    0  LC        INTEGER     ARRAY     COMA         REFS        8        19
    0  NGP       INTEGER     ARRAY       F.P.       REFS        4        23       28   DEFINED        1        23
  111  NGPI      INTEGER                            REFS       29    DEFINED      28
    0  NGPTOT    INTEGER                 F.P.       REFS       15    DEFINED       1         15
  106  NLIN      INTEGER                            REFS       21        22   DEFINED        16
    0  NLINES    INTEGER                 F.P.       REFS       16        17   DEFINED         1        17
    0  XGP       REAL        ARRAY       F.P.       REFS        4        30   DEFINED         1        30
    0  XTERM1    REAL        ARRAY     JUNK         REFS        7        24   DEFINED        24
   24  XTERM2    REAL        ARRAY     JUNK         REFS        7        25   DEFINED        25
    0  YGP       REAL        ARRAY       F.P.       REFS        4        31   DEFINED         1        31
   50  YTERM1    REAL        ARRAY     JUNK         REFS        7        26   DEFINED        26
   74  YTERM2    REAL        ARRAY     JUNK         REFS        7        27   DEFINED        27
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS              DEF LINE    REFERENCES
   74  10      FMT                37          19
    0  40                         32          21
  101  60      FMT                38          18
    0  80                         31          29

LOOPS   LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   23   40        I           21 32        36B                 NOT INNER
   52   80        J           29 31         4B      INSTACK

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50                 0 ITAPES (50)
       JUNK         80                 0 XTERM1 (20)          20 XTERM2 (20)           40 YTERM1 (20)
                                      60 YTERM2 (20)
       COMA         41                 0 LC     (40)          40 BR     (1)

STATISTICS
  PROGRAM LENGTH                  125B      85
  CM LABELED COMMON LENGTH        253B     171
        52000B CM USED
```

```
   1            SUBROUTINE FORK(NLINES,KEL,NGPTOT,NGP,XGP,YGP,DIST)               FORK       2
          C                                                                       FORK       3
          C                                                                       FORK       4
                DIMENSION     XGP(12,20) ,   YGP(12,20) ,      NGP(12)            FORK       5
   5            DIMENSION ITAPES(50)                                              FORK       6
                COMMON / CTAPES /ITAPES                                           FORK       7
                COMMON/JUNK/XTERM1(20),XTERM2(20),YTERM1(20),YTERM2(20)           FORK       8
                COMMON/ COMA/ LC(40) , BR                                         FORK       9
          C                                                                       FORK      10
  10      C                                                                       FORK      11
                ITAPER  =  ITAPES(5)                                              FORK      12
                ITAPEW = ITAPES(6)                                                FORK      13
          C                                                                       FORK      14
          C                                                                       FORK      15
  15            NGPTOT=2*NGPTOT                                                   FORK      16
                NLIN=NLINES                                                       FORK      17
                NLINES=2*NLINES                                                   FORK      18
                READ (ITAPER,60)  DIST                                            FORK      19
                IF ( LC(23) .EQ. 0 )    WRITE (ITAPEW,10) DIST                    FORK      20
  20            KEL=1                                                             FORK      21
                DO 40 I=1,NLIN                                                    FORK      22
                IJ=I+NLIN                                                         FORK      23
                NGP(IJ)=NGP(I)                                                    FORK      24
                XTERM1(IJ)=XTERM1(I)+DIST/12.0                                    FORK      25
  25            XTERM2(IJ)=XTERM2(I)+DIST/12.0                                    FORK      26
                YTERM1(IJ)=YTERM1(I)                                              FORK      27
                YTERM2(IJ)=YTERM2(I)                                              FORK      28
                NGPI=NGP(I)                                                       FORK      29
                DO 80 J=1,NGPI                                                    FORK      30
  30            XGP(J,IJ)=XGP(J,I)+DIST/12.0                                      FORK      31
             80 YGP(J,IJ)=YGP(J,I)                                                FORK      32
             40 CONTINUE                                                          FORK      33
          C                                                                       FORK      34
          C                                                                       FORK      35
  35      C FORMATS                                                               FORK      36
          C                                                                       FORK      37
             10 FORMAT (//5X19HDISTANCE FOR AXIS =,E10.3 //)                      FORK      38
             60 FORMAT(E10.2)                                                     FORK      39
          C                                                                       FORK      40
  40            RETURN                                                            FORK      41
                END                                                               FORK      42


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  FORK            1          40

VARIABLES       SN  TYPE            RELOCATION
   50  BR           REAL                COMA        REFS       8
    0  DIST         REAL                 F.P.       REFS      19      24      25      30   DEFINED       1      18
  107  I            INTEGER                         REFS      22      23      24      25        26      27      28
                                                      30      31   DEFINED    21
  110  IJ           INTEGER                         REFS      23      24      25      26        27      30      31
```

```
STATEMENT LABELS          DEF LINE   REFERENCES
 1455  731     FMT           288        126
 1470  732     FMT           291        130
 1474  735     FMT           292         88       122       182
 1500  736     FMT           293         89       123       183
 1504  737     FMT           294        267
 1073  1000                  267        234
    0  1998                   43         37
 1075  9999                  297        266

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   32  1998     I          37 43        15B        OPT
   60  6        K          48 49         3B      INSTACK
   65  3        I          50 67        63B                EXT REFS  NOT INNER
  137  300      J          63 66         6B      INSTACK
  165  77       K          72 76        12B        OPT
  201  4        NN         80 84        30B                NOT INNER
  202  4        I          81 84        25B                NOT INNER
  216  4        KL         83 84         5B      INSTACK
  270  40       J         107 108        5B      INSTACK
  310  11       I         112 131       46B                EXT REFS  NOT INNER
  342  14       J         127 130       12B                EXT REFS
  361  150      MZ        134 218      327B                EXT REFS  NOT INNER
  403  26       K         142 153       36B                NOT INNER
  432  26       J         150 153        3B      INSTACK
  444  17       K         156 171       46B                NOT INNER
  501  17       J         166 171        6B      INSTACK
  520  22       J         175 185       33B                EXT REFS  NOT INNER
  523  22       L         177 185       26B                EXT REFS
  555  25       J         187 217      130B                EXT REFS  NOT INNER
  574  23       I         191 193        4B      INSTACK
  605  87       I         195 216       76B                EXT REFS
  712  571      MZ        221 264      157B                EXT REFS    EXITS   NOT INNER
  731  120      I         225 261      125B                EXT REFS    EXITS   NOT INNER
  743  130      J         228 233        6B      INSTACK
  760  112      J         236 260       74B                EXT REFS

COMMON BLOCKS    LENGTH    MEMBERS - BIAS NAME(LENGTH)
       COMX         200               0 X       (100)          100 Y       (100)
       COMA          41               0 LC      (40)            40 BR      (1)
       MODD        8041               0 QZA     (8040)        8040 NC      (1)
       JUNK          80               0 XTERM1 (20)             20 XTERM2 (20)              40 YTERM1 (20)
                                     60 YTERM2 (20)
       CTAPES        50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                14773B     6651
  CM LABELED COMMON LENGTH      20334B     8412
        52000B CM USED
```

```
VARIABLES     SN  TYPE            RELOCATION
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       FORK                  7             69
       HELGX                11            207       213       244       251
       RNRW                  3            135       222       223       262       263

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       ABS        REAL       1  INTRIN            208       209       214       245       246       252       253
       MINO       INTEGER    0  INTRIN            194       203       235       240

STATEMENT LABELS                DEF LINE   REFERENCES
  553   1                          186        174
  374   2                          139        136
    0   3                           67         50
    0   4                           84         80       81        83
  244   5                           97         85
    0   6                           49         48
  360   7                          134         97
  254   8                          103        100
  356   9                          132        109
 1365   10        FMT              272        102
    0   11                         131        112
  622   12                         202        199
  335   13                         125        118      120
    0   14                         130        127
    0   17                         171        156      166
  461   21                         163        159
  540   22                         185        175      177       179
    0   23                         193        191
  512   24                         172        154
    0   25                         217        187
    0   26                         153        142      150
  441   30                         155        141
    0   40                         108        107
  666   46                         213        202      204
  42C   55                         149        145
 1401   61        FMT              275         47
 1403   62        FMT              276         51
 1406   63        FMT              277         58       99
 1410   72        FMT              278         90
    0   77                          76         72
 1024   79                         251        239      241
 1420   82        FMT              280        185
  700   87                         216        195      197       211
 1423   100       FMT              281        101
 1043   101                        258        249      254
 1037   102                        255        248      259
 1051   112                        260        236      237       257       258
    0   120                        261        225
  750   130                        233        228      229
    0   150                        218        134
    0   300                         66         63
 1427   400       FMT              282         87      121       181
 1431   450       FMT              283        138      184
    0   571                        264        221
 1442   730       FMT              285        125
```

```
VARIABLES      SN  TYPE              RELOCATION
                                                  142     155     175     187  DEFINED      47
  1560  NLN         INTEGER                      REFS     137     138     178     179  DEFINED      96     137
                                                  178     180
     0  NMOD        INTEGER   *UNUSED   F.P.  DEFINED       1
  1534  NMODES      INTEGER                      REFS      90     134     173     221  DEFINED      34
  1556  NN          INTEGER                      REFS      84  DEFINED      80
     0  NO1         INTEGER             F.P.     REFS      37     107     222     223     236     262     263
                                              DEFINED       1
     0  NPOINT      INTEGER             F.P.     REFS     140  DEFINED       1     172     173
  1600  NPT         INTEGER                      REFS     198     200     201     210     215     228
                                              DEFINED     186     198
     0  NSURF       INTEGER             F.P.     REFS      88     101     122     140     182
                                              DEFINED       1
  1577  NZLIN       INTEGER                      REFS     156     165     170  DEFINED     155
     0  P           REAL      ARRAY     F.P.     REFS       6      38  DEFINED       1
     0  Q           REAL      ARRAY     F.P.     REFS       6      39  DEFINED       1
 14217  QZ          REAL      ARRAY              REFS      11     135     149     152     163     165     168
                                                  170
     0  QZA         REAL      ARRAY     MODD     REFS      19
     0  RBBO        REAL      ARRAY     F.P.     REFS       7      38  DEFINED       1
     0  WILK        LOGICAL             F.P.     REFS      22      30      89      97     110     111     123
                                                  140     183     222     223     248     254
                                              DEFINED       1
     0  X           REAL      ARRAY     COMX     REFS      10      17     238     247     258
                                              DEFINED      38
 12505  XAT         REAL      ARRAY              REFS       8   2*202   2*205   2*206     207     213   2*239
                                                2*242   2*243     244     251  DEFINED     192     231
 14565  XC          REAL      ARRAY              REFS      15     258  DEFINED     108
  1635  XGP         REAL      ARRAY              REFS       5      69    2*74     128   2*147   2*161
                                              DEFINED      65
     0  XMW         REAL      ARRAY     F.P.     REFS       7      38  DEFINED       1
  1572  XT          REAL                         REFS     130  DEFINED     128
     0  XTERM1      REAL      ARRAY     JUNK     REFS      20      52      59      65     113     188     189
                                              DEFINED      51      52
    24  XTERM2      REAL      ARRAY     JUNK     REFS      20      53      59     115     188
                                              DEFINED      51      53
  1566  XT1         REAL                         REFS     125  DEFINED     113
  1570  XT2         REAL                         REFS     125  DEFINED     115
 14553  XX          REAL      *UNDEF             REFS      12
 13705  XY          REAL      ARRAY              REFS       9     231  DEFINED     201
  1561  X1          REAL                         REFS     102     103   2*108  DEFINED      99     103
  1563  X2          REAL                         REFS     102     104     108  DEFINED      99     104
   144  Y           REAL      ARRAY     COMX     REFS      10      17      84     108     196     210     226
                                                  237   2*258  DEFINED      39
  2215  YGP         REAL      ARRAY              REFS       5      64      65      69    2*74    2*84     129
                                                2*147   2*161     192  DEFINED      58      64      84
  1573  YT          REAL                         REFS     130  DEFINED     129
    50  YTERM1      REAL      ARRAY     JUNK     REFS      20      54      60      65     114     188     189
                                                  197  DEFINED      51      54
    74  YTERM2      REAL      ARRAY     JUNK     REFS      20      55      60     116     188     197
                                              DEFINED      51      55
  1567  YT1         REAL                         REFS     125  DEFINED     114
  1571  YT2         REAL                         REFS     125  DEFINED     116
 13375  YY          REAL      ARRAY              REFS       9     229  DEFINED     200
  1562  Y1          REAL                         REFS     102     105   2*108     258  DEFINED      99     105
  1564  Y2          REAL                         REFS     102     106     108     258  DEFINED      99     106
  1605  ZZ          REAL                         REFS     229     237  DEFINED     226
```

```
VARIABLES     SN  TYPE            RELOCATION
                                                I/O REFS     265
 1526  ITAPER    INTEGER                        DEFINED       25   I/O REFS      47        51        58        99
    0  ITAPES    INTEGER    ARRAY    CTAPES        REFS       16         21      25        26        27        28        29
                                                  30
 1527  ITAPEW    INTEGER                        DEFINED       26   I/O REFS      87        88        89        90       101
                                                 102         121        122     123       125       126       130       138
                                                 181         182        183     184       185       267
 1546  J         INTEGER                           REFS       58       2*64    2*65     2*108       128       129       130
                                                 152         168      2*170     176     2*185     4*188     2*189       190
                                                 192         193      2*197     229       231       232       237       238
                                                 247         255        256   4*258   DEFINED        58        63       107
                                                 127         150        166     175       187       228       236
 1575  JB        INTEGER                           REFS      143        147     149       151       152       157       161
                                                 163         164        165     167       168       169       170       172
                                                 173     DEFINED        139     140       143       147       151       157
                                                 161         164        167     169
 1544  K         INTEGER                           REFS       49         73    4*74       144       145       146     4*147
                                                 149         152        158     159       160     4*161       163     2*165
                                                 168       2*170    DEFINED      48        72       142       156
 1551  KEL       INTEGER                           REFS       69    DEFINED      68
 1535  KK        INTEGER                           REFS       38         40      41        42   DEFINED        36        40
                                                  42
 1557  KL        INTEGER                           REFS     3*84    DEFINED      83
    0  KSURF     LOGICAL             F.P.          REFS       22         30  DEFINED         1
 1533  L         INTEGER                           REFS     2*38         39      41     2*185   DEFINED        33        41
                                                 177
    0  LC        INTEGER    ARRAY    COMA          REFS       18         34      85       100       109       136       174
 1565  LINES     INTEGER                           REFS      119        120  DEFINED       110       111       119       124
    0  LIRR      INTEGER             F.P.          REFS       80         84     195       225   DEFINED         1
    0  LP        INTEGER   *UNUSED   F.P.       DEFINED        1
    0  M         INTEGER             F.P.          REFS       41         42      84       196       210       226
                                                DEFINED        1
 1604  MQ      * INTEGER                        DEFINED      224
 1531  MTAP49    INTEGER                           REFS      135    DEFINED      28  I/O REFS       133       219
 1530  MTAP8     INTEGER                           REFS      222        223  DEFINED        27
 1574  MZ        INTEGER                           REFS    2*138        173     184       199       210       215       224
                                                 232     DEFINED        134     221
17550  NC        INTEGER             MODD          REFS       19        135
 1541  NELAXS    INTEGER                           REFS       49         69     141   DEFINED        47
 1606  NGB       INTEGER                           REFS      230        231     232       234       235       239       240
                                               2*242         244        251  DEFINED       227       230
 1611  NGP       INTEGER    ARRAY                  REFS        5         56      57        69        73        82       110
                                                 111         117        144     146       158       160       176       190
                                                DEFINED       51
 1545  NGPI      INTEGER                           REFS       58         63      83       119       124       126       127
                                                 150         166        177     191       194       202       203     2*205
                                                 207         213    DEFINED      57        82       117       144       158
                                                 176         190
 1555  NGPL      INTEGER                           REFS     2*74        207     213   DEFINED        73       194       203
 1554  NGPO      INTEGER                           REFS       74        173  DEFINED        71        74
 1537  NGPTOT    INTEGER                           REFS       56         69      71        90   DEFINED        46        56
 1576  NGPX      INTEGER                           REFS    2*147      2*161  DEFINED       146       160
 1607  NGZ       INTEGER                           REFS      244        251  DEFINED       235       240
 1542  NICH      INTEGER                           REFS      240        241  DEFINED        47
 1543  NISP      INTEGER                           REFS      203        204  DEFINED        47
 1553  NLIN      INTEGER                           REFS       72    DEFINED      70
 1540  NLINES    INTEGER                           REFS       48         50      69        70        81        90       112
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                   1          6X,4HX(1),9X,4HY(1),9X,4HX(2),9X,4HY(2)/              INTP      287
                   2          4(2X,E12.5)/)                                         INTP      288
               731 FORMAT ( 3X,23HNO. OF POINTS ON LINE =,I5/                       INTP      289
                   1         3X,37HCOORDINATES OF POINTS (IN INCHES) ARE/           INTP      290
   290             2         3X,5HINDEX,9X,1HX,15X,1HY/)                            INTP      291
               732 FORMAT(4X,I3,3X,E14.7,3X,E14.7)                                  INTP      292
               735 FORMAT (5X17HSURFACE NUMBER = ,I3 //)                            INTP      293
               736 FORMAT (5X21HCONTROL SURFACE MODES. /)                           INTP      294
               737 FORMAT (79H LESS THAN 2 PTS ON A CHORD AVAILABLE FOR INTERPOLATION INTP     295
   295             1 - INTERPOLATION SKIPPED)                                       INTP      296
             C                                                                      INTP      297
              9999 RETURN                                                           INTP      298
                                                                                    INTP      299
                   END                                                              INTP      300


      SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  INTP           1           297

 VARIABLES       SN  TYPE            RELOCATION
     0  ABO          REAL                   F.P.      REFS       3*38   DEFINED        1
  2645  AHR          REAL         ARRAY               REFS          8       232  DEFINED       210       215
     0  ALPHA        REAL         ARRAY     F.P.      REFS         13       223      263   DEFINED         1       256
     0  ALO          REAL                   F.P.      REFS         39   DEFINED        1
 14215  AN           REAL         ARRAY               REFS         10       207      208       209     2*210       213       214
                                                       215        244       245      246     2*247       251       252       253
                                                       255        256   DEFINED      208       209       214       245       246
                                                       247        252       253
  1603  ARG          REAL                             REFS      2*197       200      201     2*202       205       206       207
                                                       210        213   DEFINED      196       205       206
  1610  AX           REAL                             REFS      2*239       242      243       244       247       251
                                                   DEFINED        238       242      243
    50  BR           REAL                  COMA       REFS         18
     0  CHR          REAL         ARRAY     F.P.      REFS         14       222      262   DEFINED         1       255
  1602  DECR         REAL                             REFS        201   DEFINED      189
 12531  DEF          REAL         ARRAY               REFS          8       165      170       185       193
                                                   DEFINED        149       152      163       165       168       170
 13351  DEFL         REAL         ARRAY               REFS          9       207      213       244       251
                                                   DEFINED        193       232
  2621  DEL          REAL         ARRAY               REFS          7        65  DEFINED        61
  1601  DELL         REAL                             REFS        189       201  DEFINED       188
  1547  DELX         REAL                             REFS         61   DEFINED       59
  1550  DELY         REAL                             REFS         61   DEFINED       60
  1552  DIST         REAL                             REFS         69       165      170
  1536  I            INTEGER                          REFS         38        39     5*51      2*52      2*53      2*54      2*55
                                                        56         57        58     2*59      2*60        61      2*64      5*65
                                                        82       3*84       113      114       115       116       117       118
                                                       125        128       129    2*192     2*193       196       210       226
                                                   DEFINED         37        50       81       112       191       195       225
     0  ICH          INTEGER      *UNUSED   F.P.   DEFINED          1
  2575  IDODS        INTEGER      ARRAY               REFS          6   DEFINED       49
  1532  ITAP         INTEGER                          REFS        262       263  DEFINED        29        30
```

```
          IF (YY(J) .NE. ZZ)  GO TO 130                                 INTP     230
          NGB  =  NGB + 1                                               INTP     231
          XAT(NGB)  =  XY(J)                                            INTP     232
          DEFL(NGB,1) = AHR(J,MZ)                                       INTP     233
      130 CONTINUE                                                      INTP     234
          IF (NGB .LT. 2) GO TO 1000                                    INTP     235
          NGZ = MINO (4,NGB)                                            INTP     236
          DO 112  J = 1,NO1                                             INTP     237
          IF (Y(J) .NE. ZZ)  GO TO 112                                  INTP     238
             AX  =  X(J)                                                INTP     239
          IF (AX.GE.XAT(1).AND. AX .LE. XAT(NGB)) GOTO 79               INTP     240
          IF (NICH .EQ. 1) NGZ = MINO (3,NGB)                           INTP     241
          IF (NICH .GE. 1) GO TO 79                                     INTP     242
          IF (AX.GT.XAT(NGB))                      AX = XAT(NGB)        INTP     243
          IF (AX .LT. XAT(1))                      AX = XAT(1)          INTP     244
          CALL HELGX (AX,AN,XAT,DEFL,NGB,1,NGZ,1,20,0,1)                INTP     245
          IF (ABS(AN(1,1)).LE. 1.0E-05) AN(1,1) = 0.                    INTP     246
          IF (ABS(AN(1,2)).LE. 1.0E-04) AN(1,2) = 0.                    INTP     247
          AN(1,1)     = AN(1,1) + (X(J) - AX) * AN(1,2)                 INTP     248
          IF (.NOT.WILK) GOTO 102                                       INTP     249
          GO TO 101                                                     INTP     250
C                                                                       INTP     251
       79 CALL HELGX (AX,AN,XAT,DEFL,NGB,1,NGZ,1,20,0,1)                INTP     252
          IF (ABS(AN(1,1)) .LE. 1.0E-05)   AN(1,1) = 0.0                INTP     253
          IF (ABS(AN(1,2)) .LE. 1.0E-04)   AN(1,2) = 0.0                INTP     254
          IF (WILK)   GO TO 101                                         INTP     255
      102 CHR(J)  =  AN(1,1)                                            INTP     256
          ALPHA(J)  =  AN(1,2)                                          INTP     257
          GO TO 112                                                     INTP     258
      101 IF ((X(J).LT.XC(J)).OR.(Y(J).LT.Y1).OR.(Y(J).GT.Y2)) GOTO 112 INTP     259
          GO TO 102                                                     INTP     260
      112 CONTINUE                                                      INTP     261
      120 CONTINUE                                                      INTP     262
          CALL RNRW (ITAP,CHR,NO1)                                      INTP     263
          CALL RNRW (ITAP,ALPHA,NO1)                                    INTP     264
      571 CONTINUE                                                      INTP     265
          REWIND ITAP                                                   INTP     266
          GO TO 9999                                                    INTP     267
     1000 WRITE (ITAPEW,737)                                            INTP     268
C                                                                       INTP     269
C                                                                       INTP     270
C FORMATS                                                               INTP     271
C                                                                       INTP     272
       10 FORMAT (//5X,42HCOORDINATES (IN INCHES) FOR HINGE LINE ARE//  INTP     273
        1           5X,4HX1 =,E10.3/5X,4HX2 =,E10.3/5X,4HY1 =,E10.3/    INTP     274
        2           5X,4HY2 =,E10.3//)                                  INTP     275
       61 FORMAT(4I5)                                                   INTP     276
       62 FORMAT(I5,4E10.2)                                             INTP     277
       63 FORMAT(8E10.2)                                                INTP     278
       72 FORMAT (2X19HMODAL DATA GIVEN AT, I4,1X9HPOINTS ON,I3,1X      INTP     279
        1          9HLINES FOR, I3,1X5HMODES)                           INTP     280
       82 FORMAT (10X,I3,5X,I3,5X,E18.7)                                INTP     281
      100 FORMAT(1H1,5X,17HSURFACE NUMBER = ,I3/)                       INTP     282
      400 FORMAT (1H1)                                                  INTP     283
      450 FORMAT (//10X27HINPUT MODAL DATA FOR MODE =, I3 //            INTP     284
        1          9X4HLINE,4X5HPOINT,8X10HDEFLECTION, /)               INTP     285
      730 FORMAT (//3X,24HTERMINAL POINTS OF LINE ,I5,2X,13HIN INCHES ARE/  INTP 286
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   24     NPOINT  =  JB                                                   INTP   173
      IF  (MZ .NE. NMODES)   NPOINT  =  JB - NGPO                         INTP   174
      IF ( LC(23) .EQ. 0 )    GO TO 1                                     INTP   175
      DO 22  J = 1,NLINES                                                 INTP   176
         NGPI  =  NGP(J)                                                  INTP   177
      DO 22  L = 1,NGPI                                                   INTP   178
      NLN  =  NLN  +  1                                                   INTP   179
      IF (NLN.LT.50)  GO TO 22                                            INTP   180
      NLN  =  12                                                          INTP   181
      WRITE (ITAPEW,400)                                                  INTP   182
      WRITE (ITAPEW,735) NSURF                                            INTP   183
      IF (WILK)  WRITE (ITAPEW,736)                                       INTP   184
      WRITE (ITAPEW,450)  MZ                                              INTP   185
   22 WRITE (ITAPEW,82)  J  ,  L  ,  DEF(L,J)                             INTP   186
    1 NPT      =  0                                                       INTP   187
      DO  25  J = 1,NLINES                                                INTP   188
      DELL     =  (XTERM2(J) - XTERM1(J)) / (YTERM2(J) - YTERM1(J))       INTP   189
      DECR     =  XTERM1(J) - YTERM1(J) * DELL                            INTP   190
         NGPI  =  NGP(J)                                                  INTP   191
      DO  23  I = 1,NGPI                                                  INTP   192
      XAT(I)  =  YGP(I,J)                                                 INTP   193
   23 DEFL(I,1)  =  DEF(I,J)                                              INTP   194
      NGPL = MINO(4,NGPI)                                                 INTP   195
      DO  87  I = 1,LIRR                                                  INTP   196
      ARG  =  Y (1 + (I-1)*M)                                             INTP   197
      IF (ARG .LT. YTERM1(J) .OR. ARG .GT. YTERM2(J))  GO TO 87           INTP   198
         NPT  =  NPT  +  1                                                INTP   199
      IF  (MZ .GT. 1)  GO TO 12                                           INTP   200
      YY (NPT)  =  ARG                                                    INTP   201
      XY(NPT)  =  DECR + ARG * DELL                                       INTP   202
   12 IF (ARG .GE. XAT(1)   .AND. ARG .LE.  XAT(NGPI))GOTO 46             INTP   203
      IF (NISP .EQ. 1) NGPL = MINO (3,NGPI)                               INTP   204
      IF (NISP .GE. 1) GO TO 46                                           INTP   205
      IF (ARG .GT.  XAT(NGPI))                     ARG = XAT(NGPI)        INTP   206
      IF (ARG .LT.   XAT(1))                        ARG = XAT(1)          INTP   207
      CALL HELGX (ARG,AN,XAT,DEFL,NGPI,1,NGPL,1,20,0,1)                   INTP   208
      IF (ABS(AN(1,1)) .LE. 1.0E-07) AN(1,1) = 0.                         INTP   209
      IF (ABS(AN(1,2)).LE.1.0E-04) AN(1,2) = 0.                           INTP   210
      AHR(NPT,MZ) = AN(1,1) + (Y(1+(I-1)*M)- ARG) * AN(1,2)               INTP   211
      GO TO 87                                                            INTP   212
C                                                                         INTP   213
   46 CALL HELGX (ARG,AN,XAT,DEFL,NGPI,1,NGPL,1,20,0,0)                   INTP   214
      IF (ABS(AN(1,1)).LE. 1.0E-07)   AN(1,1) = 0.0                       INTP   215
      AHR(NPT,MZ)  =  AN(1,1)                                             INTP   216
   87 CONTINUE                                                            INTP   217
   25    CONTINUE                                                         INTP   218
  150 CONTINUE                                                            INTP   219
      REWIND MTAP49                                                       INTP   220
C     CHORDWISE INTERPOLATION FOR DOWNWASH TERMS ----------------------    INTP   221
      DO 571  MZ = 1,NMODES                                               INTP   222
      IF (WILK)  CALL RNRW(-MTAP8,CHR,NO1)                                INTP   223
      IF (WILK)  CALL RNRW(-MTAP8,ALPHA,NO1)                              INTP   224
      MQ = MZ                                                             INTP   225
      DO 120 I = 1,LIRR                                                   INTP   226
      ZZ = Y (1 + (I-1)*M)                                                INTP   227
      NGB = 0                                                             INTP   228
      DO 130 J = 1,NPT                                                    INTP   229
```

```
      XT2  =  XTERM2(I) * 12.0                                           INTP    116
      YT2  =  YTERM2(I) * 12.0                                           INTP    117
      NGPI  =  NGP(I)                                                    INTP    118
      IF ( I .EQ. 1 )    GO TO 13                                        INTP    119
      LINES  =  LINES + 9 + NGPI                                         INTP    120
      IF ( LINES . LT. 55 )  GO TO 13                                    INTP    121
      WRITE (ITAPEW,400)                                                 INTP    122
      WRITE (ITAPEW,735) NSURF                                           INTP    123
      IF ( WILK )   WRITE (ITAPEW,736)                                   INTP    124
      LINES  =  9 + NGPI                                                 INTP    125
   13 WRITE (ITAPEW,730)  I , XT1 , YT1 , XT2 , YT2                      INTP    126
      WRITE (ITAPEW,731)  NGPI                                           INTP    127
      DO 14  J = 1,NGPI                                                  INTP    128
      XT  =  XGP(J,I) * 12.0                                             INTP    129
      YT  =  YGP(J,I) * 12.0                                             INTP    130
   14 WRITE (ITAPEW,732)  J , XT , YT                                    INTP    131
   11 CONTINUE                                                           INTP    132
    9 CONTINUE                                                           INTP    133
      REWIND MTAP49                                                      INTP    134
    7 DO 150 MZ = 1,NMODES                                               INTP    135
      CALL RNRW (-MTAP49,QZ,NC)                                          INTP    136
      IF ( LC(23) .EQ. 0 )    GO TO 2                                    INTP    137
      NLN = NLN + 4                                                      INTP    138
      IF (MZ.EQ.1.OR.NLN.LT.48) WRITE (ITAPEW,450) MZ                    INTP    139
    2 JB      =  0                                                       INTP    140
      IF (NSURF.GT.1.OR.WILK)   JB = NPOINT                              INTP    141
      IF (NELAXS.NE.0)  GO TO 30                                         INTP    142
      DO 26  K = 1,NLINES                                                INTP    143
      JB  =  JB + 1                                                      INTP    144
      NGPI  =  NGP(K)                                                    INTP    145
      IF  (K.EQ.1)   GO TO 55                                            INTP    146
      NGPX  =  NGP (K-1)                                                 INTP    147
      IF (XGP(1,K) .EQ. XGP(NGPX,K-1) .AND. YGP(1,K) .EQ. YGP(NGPX,K-1)) INTP    148
     1          JB  =  JB  -  1                                          INTP    149
   55 DEF (1,K) = QZ (JB)                                                INTP    150
      DO 26  J = 2,NGPI                                                  INTP    151
        JB  = JB + 1                                                     INTP    152
      DEF (J,K) = QZ (JB)                                                INTP    153
   26 CONTINUE                                                           INTP    154
      GO  TO  24                                                         INTP    155
   30 NZLIN  =  NLINES / 2                                               INTP    156
      DO 17  K = 1,NZLIN                                                 INTP    157
        JB = JB + 1                                                      INTP    158
      NGPI  =  NGP (K)                                                   INTP    159
      IF (K.EQ.1)   GO TO 21                                             INTP    160
      NGPX  =  NGP (K-1)                                                 INTP    161
      IF (XGP(1,K) .EQ. XGP(NGPX,K-1) .AND. YGP(1,K) .EQ. YGP(NGPX,K-1)) INTP    162
     1          JB  =  JB  -  2                                          INTP    163
   21 DEF (1,K) = QZ (JB)                                                INTP    164
      JB  =  JB  +  1                                                    INTP    165
      DEF (1,K+NZLIN) = DEF (1,K) + QZ(JB) * DIST                        INTP    166
      DO 17  J = 2,NGPI                                                  INTP    167
         JB  =  JB  +  1                                                 INTP    168
      DEF (J,K)  =  QZ(JB)                                               INTP    169
         JB  =  JB  +  1                                                 INTP    170
      DEF (J,K+NZLIN) = DEF (J,K) + QZ (JB) * DIST                       INTP    171
   17 CONTINUE                                                           INTP    172
```

```
      READ (ITAPER,63) (YGP(J,I),J=1,NGPI)
      DELX = XTERM2(I)-XTERM1(I)
      DELY = YTERM2(I)-YTERM1(I)
            DEL(I)  =  DELX / DELY
C             POINTS  ON  LINE  ***********************************
      DO 300 J=1,NGPI
        YGP(J,I)  =  YGP(J,I) / 12.0
      XGP(J,I)  =  XTERM1(I)  +  (YGP(J,I) - YTERM1(I)) * DEL(I)
  300 CONTINUE
    3 CONTINUE
      KEL=0
      IF(NELAXS.EQ.1)CALL FORK(NLINES,KEL,NGPTOT,NGP,XGP,YGP,DIST)
      NLIN=NLINES-1
      NGPO=NGPTOT
      DO 77 K=1,NLIN
      NGPL=NGP(K)
      IF(XGP(NGPL,K).EQ.XGP(1,K+1).AND.YGP(NGPL,K).EQ.YGP(1,K+1))
     1NGPO=NGPO-1
   77 CONTINUE


C
      DO 4 NN=1,LIRR
      DO 4 I=1,NLINES
      NGPI=NGP(I)
      DO 4 KL=1,NGPI
    4 IF(YGP(KL,I).EQ.Y((LIRR+1-NN)*M)) YGP(KL,I)=YGP(KL,I)-.001
      IF (LC(23) .EQ. 0) GOTO 5

      WRITE (ITAPEW,400)
      WRITE (ITAPEW,735)NSURF
      IF(WILK)WRITE (ITAPEW,736)
      WRITE (ITAPEW,72)NGPTOT,NLINES,NMODES

C     INTERPOLATE AND EXTRAPOLATE TO GET INTERMEDIATE DISPLACEMENTS
C     ON GIVEN LINE

C     MODAL LOOP
      NLN = 8
    5 IF(.NOT.WILK) GOTO 7
C     READ END POINTS OF HINGE LINE
      READ (ITAPER,63) X1,Y1,X2,Y2
      IF ( LC(23) .EQ. 0 )    GO TO 8
      WRITE (ITAPEW,100) NSURF
      WRITE (ITAPEW,10) X1,X2,Y1,Y2
    8 X1        =  X1 / 12.
      X2        =  X2 / 12.
      Y1        =  Y1 / 12.
      Y2        =  Y2 / 12.
      DO 40 J=1,NO1
   40 XC(J) = X1 + (X2-X1)*(Y(J)-Y1)/(Y2-Y1)
      IF ( LC(23) .EQ. 0 )      GO TO 9
      IF ( .NOT. WILK )         LINES = 13 + NGP(1)
      IF ( WILK )               LINES = 27 + NGP(1)
      DO 11  I = 1,NLINES
      XT1  =  XTERM1(I) * 12.0
      YT1  =  YTERM1(I) * 12.0
```

```
      SUBROUTINE INTP (P,Q,M,LIRR,NO1,NMOD,ABO,LP,NSURF,RBBO,           INTP   2
     1                 XMW,ALO,WILK,ALPHA,CHR,ICH,KSURF,NPOINT)         INTP   3
C                                                                       INTP   4
C                                                                       INTP   5
      DIMENSION        NGP(20) ,   XGP(12,20) ,   YGP(12,20)            INTP   6
      DIMENSION      IDODS(20) ,        Q(10) ,        P(10)            INTP   7
      DIMENSION       RBBO(10) ,      XMW(10) ,      DEL(20)            INTP   8
      DIMENSION    AHR(200,20) ,      XAT(20) ,   DEF(20,20)            INTP   9
      DIMENSION     DEFL(20,1) ,      YY(200) ,      XY(200)            INTP  10
      DIMENSION        AN(1,2) ,       X(100) ,       Y(100)            INTP  11
      DIMENSION        QZ(220)                                          INTP  12
      DIMENSION         XX(10)                                          INTP  13
      DIMENSION     ALPHA(100)                                          INTP  14
      DIMENSION       CHR(100)                                          INTP  15
      DIMENSION XC(100)                                                 INTP  16
      DIMENSION ITAPES(50)                                              INTP  17
      COMMON/COMX/X,Y                                                   INTP  18
      COMMON /COMA/ LC(40) , BR                                         INTP  19
      COMMON /MODD/ QZA(8040), NC                                       INTP  20
      COMMON/JUNK/XTERM1(20),XTERM2(20),YTERM1(20),YTERM2(20)           INTP  21
      COMMON / CTAPES / ITAPES                                          INTP  22
      LOGICAL   WILK,  KSURF                                            INTP  23
C                                                                       INTP  24
C                                                                       INTP  25
      ITAPER = ITAPES(5)                                                INTP  26
      ITAPEW = ITAPES(6)                                                INTP  27
      MTAP8  =  ITAPES(28)                                              INTP  28
      MTAP49 =  ITAPES(49)                                              INTP  29
      ITAP   =  ITAPES(29)                                              INTP  30
      IF (.NOT.WILK .AND. KSURF) ITAP = ITAPES(28)                      INTP  31
C                                                                       INTP  32
C                                                                       INTP  33
      L=1                                                               INTP  34
      NMODES = LC(2)                                                    INTP  35
C                                                                       INTP  36
      KK=0                                                              INTP  37
      DO 1998 I=1,NO1                                                   INTP  38
      X(I)=P(KK+1)*ABO*RBBO(L)+XMW(L)*ABO+ABO                           INTP  39
      Y(I)=-Q(L)*ALO                                                    INTP  40
      KK      =  KK + 1                                                 INTP  41
      IF(KK.EQ.M) L=L+1                                                 INTP  42
      IF(KK.EQ.M) KK=0                                                  INTP  43
 1998 CONTINUE                                                          INTP  44
                                                                        INTP  45
                                                                        INTP  46
      NGPTOT=0                                                          INTP  47
      READ (ITAPER,61) NLINES,NELAXS,NICH,NISP                          INTP  48
      DO 6 K = 1,NLINES                                                 INTP  49
    6 IDODS(K) = 1 + NELAXS                                             INTP  50
      DO 3 I=1,NLINES                                                   INTP  51
      READ (ITAPER,62) NGP(I),XTERM1(I),YTERM1(I),XTERM2(I),YTERM2(I)   INTP  52
      XTERM1(I)=XTERM1(I)/12.0                                          INTP  53
      XTERM2(I)=XTERM2(I)/12.0                                          INTP  54
      YTERM1(I)=YTERM1(I)/12.0                                          INTP  55
      YTERM2(I)=YTERM2(I)/12.0                                          INTP  56
      NGPTOT=NGPTOT+NGP(I)                                              INTP  57
      NGPI=NGP(I)                                                       INTP  58
```

```
 22 CALL CONB(RE5,RE6,RI5,RI6)                                          INVK    116
    REK = RE1 - RE5 + RE6                                               INVK    117
    RIK = RI2 + RI3 - RI5 + RI6                                         INVK    118
    XOK = ZK*XOW                                                        INVK    119
    SO = SIN(XOK)                                                       INVK    120
    CO = COS(XOK)                                                       INVK    121
    AXKR = ZK*ZK*(REK*CO+RIK*SO)                                        INVK    122
    AXKI = ZK*ZK*(RIK*CO-REK*SO)                                        INVK    123
 23 CETR = C3*AXKR                                                      INVK    124
    CETI = C3*AXKI                                                      INVK    125
    IF(KKF.EQ.0)GO TO 25                                                INVK    126
    IF(LINE.EQ.0)WRITE (ITAPEW,3)ISI,ZM,ZK                              INVK    127
    LINE = LINE + 1                                                     INVK    128
    IF(LINE.GT.50)LINE=0                                                INVK    129
    WRITE (ITAPEW,26) Y(K),X(I),ETA(IS),XI(IN),YOW,XOW,AXKR,AXKI        INVK    130
 25 DO 27 M1 =1,LIRR                                                    INVK    131
    NU = 2*(M1-1) + IND                                                 INVK    132
    IF (NU) 28,77,28                                                    INVK    133
 77 ETANU = 1.0                                                         INVK    134
    GO TO 29                                                            INVK    135
 28 IF (ETA(IS)) 31,30,31                                               INVK    136
 30 ETANU = 0.0                                                         INVK    137
    GO TO 29                                                            INVK    138
 31 ETANU = ETA(IS)**NU                                                 INVK    139
 29 CXF = 1.0 - XI(IN)                                                  INVK    140
    F3R(1,M1) = F3R(1,M1) + CETR*ETANU*CXF                              INVK    141
    F3I(1,M1) = F3I(1,M1) + CETI*ETANU*CXF                              INVK    142
    CXF = CXF*(1.0+XI(IN))                                              INVK    143
    F3R(2,M1) = F3R(2,M1) + CETR*ETANU*CXF                              INVK    144
    F3I(2,M1) = F3I(2,M1) + CETI*ETANU*CXF                              INVK    145
    GO TO (27,27,32,32,32),M                                            INVK    146
 32 DO 33 II =3,M                                                       INVK    147
    CXF = CXF*XI(IN)                                                    INVK    148
    F3R(II,M1) = F3R(II,M1) + CETR*ETANU*CXF                            INVK    149
 33 F3I(II,M1) = F3I(II,M1) + CETI*ETANU*CXF                            INVK    150
 27 CONTINUE                                                            INVK    151
 17 CONTINUE                                                            INVK    152
    IK = MAM*(K-1)+I                                                    INVK    153
    DO 34 IJ =1,NNP                                                     INVK    154
    M1 = IJ-LIRR*((IJ-1)/LIRR)                                          INVK    155
    M2 = (IJ-1)/LIRR + 1                                                INVK    156
    NU = 2*(M1-1) + IND                                                 INVK    157
    IF (NU) 36,35,36                                                    INVK    158
 35 YNU = 1.0                                                           INVK    159
    GO TO 37                                                            INVK    160
 36 YNU = Y(K)**NU                                                      INVK    161
 37          G       = F3R(M2,M1) + (F1(M2) + F2R(M2)) * YNU * SS       INVK    162
             H       = F3I(M2,M1) + F2I(M2) * YNU * SS                  INVK    163
 34 AIC(IK,IJ) = CMPLX (G,H)                                            INVK    164
  4 CONTINUE                                                            INVK    165
    REWIND MTAP10                                                       INVK    166
    WRITE(MTAP10) AIC                                                   INVK    167
    REWIND MTAP10                                                       INVK    168
    IF (R.GE.0.05)             GO TO 102                                INVK    169
    WRITE (ITAPEW,101)R,IBX,IBY,IBXI,IBET                               INVK    170
102 CONTINUE                                                            INVK    171
    LITE = 0                                                            INVK    172
```

```
      IF (KGH) 38,39,38
   38 DO 46 I=1,NN
      IF(LITE.EQ.O)WRITE (ITAPEW,40)ISI,ZM,ZK
      LNS=NNP/4
      LDNS=NNP-4*LNS
      IF(LDNS.NE.O)LNS=LNS+1
      LNS=LNS+2
      LITE=LITE+LNS
      IF(LITE.GT.50)LITE=O
      WRITE (ITAPEW,44)I
      WRITE(ITAPEW,41) (AIC(I,J),J=1,NNP)
   46 CONTINUE
C
C
C FORMATS
C
    3 FORMAT (1H1,6X14HSURFACE NO. = ,I3,9X10HMACH NO. = ,E10.3,10X
     1        20HREDUCED FREQUENCY = ,E10.3, //6X6HY(BAR),9X6HX(BAR),
     2        8X8HETA(BAR),8X6HX(BAR),9X4HY(O),11X4HX(O),9X
     3        10HKERF(REAL),5X10HKERF(IMAG), //)
   26 FORMAT (8(3X,1PE12.5))
   40 FORMAT (1H1,5X14HSURFACE NO. = ,I3,5X11HMACH NO. = ,E10.3,5X44HRED
     1UCED FREQUENCY BASED ON ROOT SEMI-CHORD =,E10.3,//5X77HL MATRIX--R
     2ELATES DOWNWASH TO PRESSURE POLYNOMIAL COEFFICIENTS BY (W)=(L)*(A)
     3,//1X6HROW NO,25X36HCOMPLEX ELEMENTS BY ROWS (REAL,IMAG),//)
   41 FORMAT(/( T8,1PE10.3,T20,1PE10.3, T6,2H (,T18,2H, , T30,2H) ,
     1          T34,1PE10.3,T46,1PE10.3,T32,2H (,T44,2H, , T56,2H) ,
     2          T60,1PE10.3,T72,1PE10.3,T58,2H (,T70,2H, , T82,2H) ,
     3          T86,1PE10.3,T98,1PE10.3,T84,2H (,T96,2H, ,T108,2H) ))
   44 FORMAT(I5)
  101 FORMAT (1H1,4X51HMINIMUM DISTANCE BETWEEN COLL. PTS. AND INT. PTS.
     1 =,G10.3 //5X33HINDICES FOR POINTS ARE AS FOLLOWS, //5X18HCOLLOCAT
     2ION POINTS,//7X1HX,10X1HY,//5X,I5,5X,I5//5X18HINTEGRATION POINTS,
     3//6X2HXI,8X3HETA,//5X,I5,5X,I5 //)
C
   39 RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	INVK	1	207

VARIABLES		SN TYPE		RELOCATION							
11	ABO	REAL		COMB	REFS	9	32				
1327	AIC	COMPLEX	ARRAY		REFS	6	17	166	182	DEFINED	163
1152	AJ	REAL			REFS	70	DEFINED	69			
12	ALO	REAL		COMB	REFS	9	32				
1121	ALOB	REAL			REFS	2*33	91	DEFINED	32		
1122	ALOB2	REAL			REFS	43	DEFINED	33			
1142	ANGLE	REAL			REFS	52	53	57	DEFINED	50	
1147	ANIN	REAL			REFS	67	70	DEFINED	66		
1176	AXKI	REAL			REFS	124	129	DEFINED	113	122	

```
VARIABLES    SN  TYPE          RELOCATION
  1175  AXKR     REAL                        REFS       123      129  DEFINED      112      121
     4  BETA     REAL                COMJ    REFS        15     2*36
     5  BETAX    REAL                COMJ    REFS        15  DEFINED       35
  1124  BETA2    REAL                        REFS       111  DEFINED       36
    50  BR       REAL                COMA    REFS         8
  1157  CAF      REAL                        REFS        75       76       77       78       79       82       83
                                               84   DEFINED       74       77       82
  1211  CETI     REAL                        REFS       141      144      149  DEFINED      124
  1210  CETR     REAL                        REFS       140      143      148  DEFINED      123
  1207  CO       REAL                        REFS       121      122  DEFINED      120
  1155  COF      REAL                        REFS        75       78       83  DEFINED       72
  1214  CXF      REAL                        REFS       140      141      142      143      144      147      148
                                              149   DEFINED      139      142      147
  1133  C1       REAL                        REFS        97  DEFINED       43
  1134  C2       REAL                        REFS        67  DEFINED       44
  1150  C22      REAL                        REFS        74  DEFINED       67
  1170  C3       REAL                        REFS       123      124  DEFINED       97
   170  ETA      REAL       ARRAY    COMD    REFS        10       91     2*97      129      135      138
  1213  ETANU    REAL                        REFS       140      141      143      144      148      149
                                          DEFINED       133      136      138
  1125  FN       REAL                        REFS        43  DEFINED       37
  1226  F1       REAL       ARRAY            REFS         4      161  DEFINED       52       53       55       57
                                               59
  1240  F2I      REAL       ARRAY            REFS         4       76       79       84      162
                                          DEFINED        62       76       79       84
  1233  F2R      REAL       ARRAY            REFS         4       75       78       83      161
                                          DEFINED        61       75       78       83
  1276  F3I      REAL       ARRAY            REFS         5      141      144      149      162
                                          DEFINED        89      141      144      149
  1245  F3R      REAL       ARRAY            REFS         5      140      143      148      161
                                          DEFINED        88      140      143      148
  1221  G        REAL                        REFS       163  DEFINED      161
  1222  H        REAL                        REFS       163  DEFINED      162
  1137  I        INTEGER                     REFS      2*48       49       53       57     2*59       64     2*70
                                               71        74       99      103      129      152      181      182
                                          DEFINED        47      173
  1117  IBET     INTEGER                     REFS       169  DEFINED       29      106
  1114  IBX      INTEGER                     REFS       169  DEFINED       26      103
  1116  IBXI     INTEGER                     REFS       169  DEFINED       28      105
  1115  IBY      INTEGER                     REFS       169  DEFINED       27      104
  1215  II       INTEGER                     REFS     2*148    2*149  DEFINED      146
  1217  IJ       INTEGER                     REFS     2*154      155      163  DEFINED      153
  1216  IK       INTEGER                     REFS       163  DEFINED      152
  1171  IN       INTEGER                     REFS        99      105      129      139      142      147
                                          DEFINED        98
     0  IND      INTEGER             F.P.    REFS       131      156  DEFINED        1
     2  IRR      INTEGER             COMB    REFS         9
  1163  IS       INTEGER                     REFS        91     2*97     2*99      106      129      135      138
                                          DEFINED        90
     0  ISI      INTEGER             COMB    REFS         9      126      174
     4  ISS      INTEGER             COMB    REFS         9       38       90
     0  ITAPES   INTEGER    ARRAY    CTAPES  REFS         7       16       20       21
  1111  ITAPEW   INTEGER                  DEFINED        20  I/O REFS      126      129      169      174      181
                                              182
  1151  J        INTEGER                     REFS        69      182  DEFINED       68      182
  1130  JIRR     INTEGER                     REFS        46  DEFINED       40
  1160  JJ       INTEGER                     REFS      2*83     2*84  DEFINED       81
```

```
VARIABLES      SN  TYPE           RELOCATION
 1136  K           INTEGER                          REFS       64       71       91     2*99      104      129      152
                                                     160  DEFINED       46
    1  KGH         INTEGER              COMH        REFS       13      172
 1144  KK          INTEGER                          REFS       61       62  DEFINED       60
    2  KKF         INTEGER              COMH        REFS       13      125
    0  KQR         INTEGER              COMH        REFS       13
    0  LC          INTEGER   ARRAY      COMA        REFS        8       24     2*31
 1225  LDNS        INTEGER                          REFS      177  DEFINED      176
 1135  LINE        INTEGER                          REFS      126      127      128  DEFINED       45      127      128
    5  LIRA        INTEGER              COMB        REFS        9       40
 1132  LIRR        INTEGER                          REFS       87      130    2*154      155  DEFINED       42
 1223  LITE        INTEGER                          REFS      174      179      180  DEFINED      171      179      180
 1224  LNS         INTEGER                          REFS      176      177      178      179  DEFINED      175      177
                                                     178
 1161  L1          INTEGER                          REFS       88       89  DEFINED       86
 1131  M           INTEGER                          REFS       54       56       58       60       65       80       81
                                                      86      145      146  DEFINED       41
    1  MA          INTEGER              COMB        REFS        9       39
 1127  MAM         INTEGER                          REFS       47      152  DEFINED       39
    0  MCC         INTEGER              COMF        REFS       12       41
 1112  MTAP10      INTEGER                       DEFINED       21 I/O REFS      165      166      167
 1162  M1          INTEGER                          REFS       88       89      131    2*140    2*141    2*143    2*144
                                                   2*148    2*149      156      161      162  DEFINED       87      130
                                                     154
   13  M2          INTEGER              COMB        REFS        9    3*161    2*162  DEFINED      155
    3  N           INTEGER              COMB        REFS        9       37       98
    3  NHV         INTEGER              COMH        REFS       13
 1146  NIN         INTEGER                          REFS       66       68  DEFINED       65
    1  NLRR        INTEGER              COMF        REFS       12       42
   10  NMOD        INTEGER              COMB        REFS        9  DEFINED       24
 1120  NN          INTEGER                          REFS      173  DEFINED       30
    2  NNP         INTEGER              COMF        REFS       12      153      175      176      182
 1145  NO          INTEGER                          REFS       65  DEFINED       64
    6  NO1         INTEGER              COMB        REFS        9       30
    7  NO2         INTEGER              COMB        REFS        9
 1212  NU          INTEGER                          REFS      132      138      157      160  DEFINED      131      156
 1123  PI          REAL                             REFS       43       44       52       53       57       64       70
                                                 DEFINED       34
 1113  R           REAL                             REFS      102      168      169  DEFINED       25      107
   36  RBBO        REAL      ARRAY      COMD        REFS       10       64       71       99
 1203  REK         REAL                             REFS      121      122  DEFINED      116
 1165  RE1         REAL                             REFS       96      116
    6  RE4         REAL                 COMJ        REFS       15
    7  RE4X        REAL                 COMJ        REFS       15
 1177  RE5         REAL                             REFS      115      116
 1200  RE6         REAL                             REFS      115      116
 1204  RIK         REAL                             REFS      121      122  DEFINED      117
 1166  RI2         REAL                             REFS       96      117
 1167  RI3         REAL                             REFS       96      117
 1201  RI5         REAL                             REFS      115      117
 1202  RI6         REAL                             REFS      115      117
   10  RM4         REAL                 COMJ        REFS       15
   11  RM4X        REAL                 COMJ        REFS       15
 1173  R1          REAL                             REFS      102      107  DEFINED      101
 1143  SA          REAL                             REFS       52       53       55       57       59
                                                 DEFINED       51
  500  SBBO        REAL      ARRAY      COMD        REFS       10       99
```

```
VARIABLES     SN  TYPE           RELOCATION
 1156  SIF        REAL                             REFS       76        79        84   DEFINED        73
 1206  SO         REAL                             REFS      121       122   DEFINED       119
 1126  SS         REAL                             REFS       43       161       162   DEFINED        38
 1141  TANG       REAL                             REFS       50   DEFINED        49
    0  X          REAL       ARRAY     COMD        REFS       10      2*48        49        53        57      2*59       64
                                                   2*70       71        74        99       129
   74  XI         REAL       ARRAY     COMD        REFS       10        99       129       139       142       147
   50  XII        REAL       ARRAY     COMD        REFS       10
  334  XIMW       REAL       ARRAY     COMD        REFS       10        99
   24  XMW        REAL       ARRAY     COMD        REFS       10        99
 1205  XOK        REAL                             REFS      119       120   DEFINED       118
    2  XOW        REAL                 COMJ        REFS       15     2*100     2*101       112       118       129
                                                DEFINED       99
    3  XOWX       REAL                 COMJ        REFS       15
 1172  XOW2       REAL                             REFS      111   DEFINED       100
 1154  XOZ        REAL                             REFS       72        73   DEFINED        71
 1140  XSQ        REAL                             REFS       49        52        53      3*55      3*57      3*59
                                                DEFINED       48
 1153  XX         REAL                             REFS       71      2*74        77        82   DEFINED        70
 1174  XYB        REAL                             REFS      112   DEFINED       111
   12  Y          REAL       ARRAY     COMD        REFS       10        91       129       160
 1220  YNU        REAL                             REFS      161       162   DEFINED       158       160
    2  YOW        REAL                 COMI        REFS       14      2*92     2*101       129   DEFINED        91
    3  YOWX       REAL                 COMI        REFS       14
 1164  YOW2       REAL                             REFS      111       112   DEFINED        92
    0  ZK         REAL                 COMI        REFS       14        63        64        72        73        93      109
                                                    118    2*121     2*122       126       174   DEFINED        31
    1  ZKX        REAL                 COMI        REFS       14
    0  ZM         REAL                 COMJ        REFS       15       126       174
    1  ZMX        REAL                 COMJ        REFS       15
    3  Z1A        REAL                 COMF        REFS       12
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       ATAN         REAL      1 LIBRARY     50
       CONA                   3             96
       CONB                   4            115
       COS          REAL      1 LIBRARY     70        72       120
       SIN          REAL      1 LIBRARY     73       119
       SQRT         REAL      1 LIBRARY     48        74       101       111

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE   REFERENCES
       CMPLX      COMPLEX     2  INTRIN                 163

STATEMENT LABELS              DEF LINE   REFERENCES
  742  3       FMT               188        126
    0  4                         164         46        47
  147  5                          60       2*54      3*56      4*58
  102  6                          55       3*54
  117  7                          57       2*56
  141  8                          59         58
    0  9                          62         60
  265  10                         86       2*63
    0  11      INACTIVE           64         63
  262  12                         85         68      2*80
  246  14                         81       3*80
    0  15                         84         81
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
    0  16                          89         86        87
    0  17                         151         90        98
    0  18            INACTIVE      94       2*93
  312  19                          96         93
  314  20                          97         95
    0  21            INACTIVE     110       2*109
  356  22                         115        109
  403  23                         123        114
  430  25                         130        125
  765  26        FMT              192        129
  517  27                         150        130      2*145
  437  28                         135       2*132
  445  29                         139        134       137
    0  30            INACTIVE     136        135
  442  31                         138       2*135
  474  32                         146       3*145
    0  33                         149        146
    0  34                         163        153
    0  35            INACTIVE     158        157
  545  36                         160       2*157
  550  37                         161        159
    0  38            INACTIVE     173       2*172
  647  39                         207        172
  770  40        FMT              193        174
 1022  41        FMT              197        182
 1047  44        FMT              201        181
    0  46                         183        173
    0  77            INACTIVE     133        132
  343  100                        108        102
 1051  101       FMT              202        169
  605  102                        170        168

LOOPS  LABEL     INDEX      FROM-TO    LENGTH    PROPERTIES
   51  4         K           46 164     523B              EXT REFS  NOT INNER
   52  4         I           47 164     517B              EXT REFS  NOT INNER
  152  9         KK          60 62        3B     INSTACK
  174  12        J           68 85       71B              EXT REFS  NOT INNER
  252  15        JJ          81 84        7B     INSTACK
  266  16        L1          86 89       14B              NOT INNER
  273  16        M1          87 89        3B     INSTACK
  303  17        IS          90 151     224B              EXT REFS  NOT INNER
  321  17        IN          98 151     203B              EXT REFS  NOT INNER
  431  27        M1         130 150      71B              EXT REFS  NOT INNER
  507  33        II         146 149       7B     INSTACK
  533  34        IJ         153 163      34B              EXT REFS
  610  46        I          173 183      37B              EXT REFS  NOT INNER
  632            J          182 182      11B              EXT REFS

COMMON BLOCKS    LENGTH    MEMBERS - BIAS NAME(LENGTH)
       COMA          41            0 LC     (40)           40 BR    (1)
       COMB          12            0 ISI    (1)             1 MA    (1)            2 IRR   (1)
                                   3 N      (1)             4 ISS   (1)            5 LIRA  (1)
                                   6 NO1    (1)             7 NO2   (1)            8 NMOD  (1)
                                   9 ABO    (1)            10 ALO   (1)           11 M2    (1)
       COMD         420            0 X      (10)           10 Y     (10)          20 XMW   (10)
                                  30 RBBO   (10)           40 XII   (20)          60 XI    (60)
                                 120 ETA    (100)         220 XIMW  (100)        320 SBBO  (100)
```

```
COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
      COMF           4               0 MCC      (1)             1 NLRR    (1)             2 NNP     (1)
                                     3 Z1A      (1)
      COMH           4               0 KQR      (1)             1 KGH     (1)             2 KKF     (1)
                                     3 NHV      (1)
      COMI           4               0 ZK       (1)             1 ZKX     (1)             2 YOW     (1)
                                     3 YOWX     (1)
      COMJ          10               0 ZM       (1)             1 ZMX     (1)             2 XOW     (1)
                                     3 XOWX     (1)             4 BETA    (1)             5 BETAX   (1)
                                     6 RE4      (1)             7 RE4X    (1)             8 RM4     (1)
                                     9 RM4X     (1)
      CTAPES        50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 13142B     5730
  CM LABELED COMMON LENGTH        1041B      545
          52000B CM USED
```

```
 1                 SUBROUTINE CONB(RE5,RE6,RI5,RI6)                                    CONB      2
             C                                                                         CONB      3
                   COMMON/COMI/ZK,ZKX,YOE,YOEX                                         CONB      4
                   COMMON/COMJ/ZM,ZMX,XOE,XOEX,BETA,BETAX,RE4,RE4X,RM4,RM4X            CONB      5
 5                 YOE = ABS(YOE)                                                      CONB      6
                   Z = YOE*ZK                                                          CONB      7
                   XOK = ZK*XOE                                                        CONB      8
                   IF(ZM.GT.0.99)GO TO 4                                               CONB      9
                   SQ = SQRT(XOK**2+BETA**2*Z**2)                                      CONB     10
 10                ARG = (XOK-ZM*SQ)/BETA**2                                           CONB     11
                   CO5 = XOK/(Z**2*SQ)                                                 CONB     12
                   GO TO 5                                                             CONB     13
                 4 ARG = (XOK-Z*Z/XOK)/2.0                                             CONB     14
                   CO5 = 1.0/(Z*Z)                                                     CONB     15
 15              5 RI5 = CO5*SIN(ARG)                                                  CONB     16
                   RE5 = CO5*COS(ARG)                                                  CONB     17
                   BETA2=BETA*BETA                                                     CONB     18
                   IF(ZM.GT.0.99)GO TO 7                                               CONB     19
                   A=(XOE-ZM*SQRT(XOE*XOE+BETA2*YOE*YOE))/(BETA2*YOE)                  CONB     20
 20                GO TO 6                                                             CONB     21
                 7 A=(XOE/YOE-YOE/XOE)/2.0                                             CONB     22
                 6 SIGNA=SIGN(1.0,A)                                                   CONB     23
                   ABSA=ABS(A)                                                         CONB     24
                   X1=ABSA                                                             CONB     25
 25                IF(ABSA.GT.2.0)X1=2.0                                               CONB     26
                   CALL QUADX(X1,Z,REX,EMX)                                            CONB     27
                   IF(ABSA.LE.2.0)GO TO 1                                              CONB     28
                   X1=ABSA                                                             CONB     29
                   IF(X1.GT.10.0)X1=10.0                                               CONB     30
 30                CALL QUAXA(X1,Z,XREX,XEMX)                                          CONB     31
                   REX=REX+XREX                                                        CONB     32
                   EMX=EMX+XEMX                                                        CONB     33
                   IF(ABSA.LE.10.0)GO TO 1                                             CONB     34
                   CALL QUAYB(ABSA,Z,YREX,YEMX)                                        CONB     35
 35                REX=REX+YREX                                                        CONB     36
                   EMX=EMX+YEMX                                                        CONB     37
                 1 EMX=-EMX*SIGNA                                                      CONB     38
                   RE6=-EMX/Z                                                          CONB     39
                   RI6=REX/Z                                                           CONB     40
 40                RETURN                                                              CONB     41
                    END                                                                CONB     42
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
   3  CONB            1            40

VARIABLES      SN  TYPE            RELOCATION
  152  A           REAL                          REFS       22      23   DEFINED     19     21
  154  ABSA        REAL                          REFS       24      25        27     28     33     34
                                              DEFINED       23
  147  ARG         REAL                          REFS       15      16   DEFINED     10     13
    4  BETA        REAL              COMJ        REFS        4       9        10   2*17
```

```
VARIABLES      SN  TYPE          RELOCATION
     5  BETAX      REAL            COMJ          REFS         4
   151  BETA2      REAL                          REFS      2*19   DEFINED      17
   150  CO5        REAL                          REFS        15        16   DEFINED      11        14
   157  EMX        REAL                          REFS        26        32        36      37        38
                                              DEFINED        32        36        37
   156  REX        REAL                          REFS        26        31        35      39   DEFINED      31      35
     6  RE4        REAL            COMJ          REFS         4
     7  RE4X       REAL            COMJ          REFS         4
     0  RE5        REAL            F.P.       DEFINED         1        16
     0  RE6        REAL            F.P.       DEFINED         1        38
     0  RI5        REAL            F.P.       DEFINED         1        15
     0  RI6        REAL            F.P.       DEFINED         1        39
    10  RM4        REAL            COMJ          REFS         4
    11  RM4X       REAL            COMJ          REFS         4
   153  SIGNA      REAL                          REFS        37   DEFINED      22
   146  SQ         REAL                          REFS        10        11   DEFINED       9
   161  XEMX       REAL                          REFS        30        32
     2  XOE        REAL            COMJ          REFS         4         7      3*19    2*21
     3  XOEX       REAL            COMJ          REFS         4
   145  XOK        REAL                          REFS         9        10        11    2*13   DEFINED       7
   160  XREX       REAL                          REFS        30        31
   155  X1         REAL                          REFS        26        29        30   DEFINED      24      25      28
                                                   29
   163  YEMX       REAL                          REFS        34        33
     2  YOE        REAL            COMI          REFS         3         5         6    3*19      2*21
                                              DEFINED         5
     3  YOEX       REAL            COMI          REFS         3
   162  YREX       REAL                          REFS        34        35
   144  Z          REAL                          REFS         9        11      2*13    2*14        26      30      34
                                                   38        39   DEFINED       6
     0  ZK         REAL            COMI          REFS         3         6         7
     1  ZKX        REAL            COMI          REFS         3
     0  ZM         REAL            COMJ          REFS         4         8        10      18        19
     1  ZMX        REAL            COMJ          REFS         4

EXTERNALS          TYPE    ARGS        REFERENCES
        COS        REAL      1 LIBRARY       16
        QUADX                4               26
        QUAXA                4               30
        QUAYB                4               34
        SIN        REAL      1 LIBRARY       15
        SQRT       REAL      1 LIBRARY        9        19

INLINE FUNCTIONS   TYPE    ARGS       DEF LINE  REFERENCES
        ABS        REAL      1  INTRIN             5        23
        SIGN       REAL      2  INTRIN            22

STATEMENT LABELS               DEF LINE   REFERENCES
   112  1                         37         27        33
    24  4                         13          8
    31  5                         15         12
    56  6                         22         20
    52  7                         21         18

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
        COMI         4                0 ZK      (1)              1 ZKX     (1)                 2 YOE     (1)
                                      3 YOEX    (1)
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      COMJ          10                0 ZM     (1)          1 ZMX    (1)          2 XOE    (1)
                                      3 XOEX   (1)          4 BETA   (1)          5 BETAX  (1)
                                      6 RE4    (1)          7 RE4X   (1)          8 RM4    (1)
                                      9 RM4X   (1)

STATISTICS
  PROGRAM LENGTH                 164B      116
  CM LABELED COMMON LENGTH        16B       14
        52000B CM USED
```

```
      SUBROUTINE  QUADX  (W,ZETA,REX,EMX)                        QUADX    2
C                                                                QUADX    3
      DIMENSION   C1(10),A1(10)                                  QUADX    4
      DATA  KTEST/0/                                             QUADX    5
      IF(KTEST.EQ.1)   GO TO 1                                   QUADX    6
      KTEST=1                                                    QUADX    7
      C1(1)=- .725642591                                         QUADX    8
      C1(2)=  .104651988E+01                                     QUADX    9
      C1(3)=- .471568448                                         QUADX   10
      C1(4)=- .138318000                                         QUADX   11
      C1(5)=- .645496168E-02                                     QUADX   12
      C1(6)=- .137733492E-01                                     QUADX   13
      C1(7)=   .295420522                                        QUADX   14
      C1(8)=   .528421787                                        QUADX   15
      C1(9)=   .435983163E-04                                    QUADX   16
      C1(10)=  .169000864E-03                                    QUADX   17
      A1(1)=-  .2398784396                                       QUADX   18
      A1(2)=-  .4734195684E-03                                   QUADX   19
      A1(3)=-  .1180816044                                       QUADX   20
      A1(4)=-  .2557061615E-01                                   QUADX   21
      A1(5)=-  .9556770514                                       QUADX   22
      A1(6)=   .4644321052                                       QUADX   23
      A1(7)=-  .6203627756                                       QUADX   24
      A1(8)=   .1057208731                                       QUADX   25
      A1(9)=-  .1305516353E+01                                   QUADX   26
      A1(10)=  .9459520710                                       QUADX   27
    1 EM=9.5                                                     QUADX   28
      Z=ZETA/EM                                                  QUADX   29
      EMW=EM*W                                                   QUADX   30
      EMZW=EMW*Z                                                 QUADX   31
      CMZW=COS(EMZW)                                             QUADX   32
      SMZW=SIN(EMZW)                                             QUADX   33
      ZCMZW=Z*CMZW                                               QUADX   34
      ZSMZW=Z*SMZW                                               QUADX   35
      Z2=Z**2                                                    QUADX   36
      REX=0.0                                                    QUADX   37
      EMX=0.0                                                    QUADX   38
      DO  2    J=1,2                                             QUADX   39
      J2=2*J                                                     QUADX   40
      J1=J2-1                                                    QUADX   41
      AJ11=A1(J1)                                                QUADX   42
      AJ12=A1(J2)                                                QUADX   43
      CJ11=C1(J1)                                                QUADX   44
      CJ12=C1(J2)                                                QUADX   45
      E11=EXP(AJ11*EMW)                                          QUADX   46
      E12=EXP(AJ12*EMW)                                          QUADX   47
      T111=E11*(AJ11*CMZW+ZSMZW)-AJ11                            QUADX   48
      T112=E12*(AJ12*CMZW+ZSMZW)-AJ12                            QUADX   49
      T211=E11*(ZCMZW-AJ11*SMZW)-Z                               QUADX   50
      T212=E12*(ZCMZW-AJ12*SMZW)-Z                               QUADX   51
      T311=AJ11**2+Z2                                            QUADX   52
      T312=AJ12**2+Z2                                            QUADX   53
      REX=REX+CJ11*(T111/T311)+CJ12*(T112/T312)                  QUADX   54
      EMX=EMX+CJ11*(T211/T311)+CJ12*(T212/T312)                  QUADX   55
    2 CONTINUE                                                   QUADX   56
      DO  4    J=5,9,2                                           QUADX   57
      J1=J+1                                                     QUADX   58
```

```
      AJ1=A1(J)
      B1=A1(J1)
      CJ1=C1(J)
      DJ1=C1(J1)
      E1=EXP(AJ1*EMW)
      T11=AJ1**2-Z2+B1**2
      T31=2.0*AJ1*Z
      T21=T31**2
      T41=AJ1*CJ1-B1*DJ1
      T51=AJ1*DJ1+B1*CJ1
      T61=Z*CJ1
      T71=Z*DJ1
      EMB1W=B1*EMW
      CC1=CMZW*COS(EMB1W)
      CS1=CMZW*SIN(EMB1W)
      SC1=SMZW*COS(EMB1W)
      SS1=SMZW*SIN(EMB1W)
      T81 =E1*(T41*CC1-T61*SC1+T51*CS1-T71*SS1)-T41
      T91 =E1*(T61*CC1+T41*SC1+T71*CS1+T51*SS1)-T61
      T101=T11*T81+T31*T91
      T111=T31*T81-T11*T91
      T121=T11**2+T21
      REX =REX +(T101/T121)
      EMX =EMX +(T111/T121)
    4 CONTINUE
      REX=REX  /EM
      EMX=EMX  /EM
      RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 QUADX	1	85

VARIABLES		SN TYPE	RELOCATION								
330	AJ1	REAL		REFS	62	63	64	66	67		
				DEFINED	58						
314	AJ11	REAL		REFS	45	2*47	49	51	DEFINED	41	
315	AJ12	REAL		REFS	46	2*48	50	52	DEFINED	42	
367	A1	REAL	ARRAY	REFS	3	41	42	58	59		
				DEFINED	17	18	19	20	21	22	23
				24	25	26					
331	B1	REAL		REFS	63	66	67	70	DEFINED	59	
345	CC1	REAL		REFS	75	76	DEFINED	71			
332	CJ1	REAL		REFS	66	67	68	DEFINED	60		
316	CJ11	REAL		REFS	53	54	DEFINED	43			
317	CJ12	REAL		REFS	53	54	DEFINED	44			
304	CMZW	REAL		REFS	33	47	48	71	72		
				DEFINED	31						
346	CS1	REAL		REFS	75	76	DEFINED	72			
355	C1	REAL	ARRAY	REFS	3	43	44	60	61		
				DEFINED	7	8	9	10	11	12	13

```
VARIABLES     SN  TYPE           RELOCATION
                                                  14        15        16
  333  DJ1        REAL                          REFS        66        67        69  DEFINED        61
  300  EM         REAL                          REFS        28        29        83        84  DEFINED        27
  344  EMB1W      REAL                          REFS        71        72        73        74  DEFINED        70
  302  EMW        REAL                          REFS        30        45        46        62        70
                                             DEFINED        29
    0  EMX        REAL                F.P.      REFS        54        81        84  DEFINED         1        37        54
                                                  81        84
  303  EMZW       REAL                          REFS        31        32  DEFINED        30
  334  E1         REAL                          REFS        75        76  DEFINED        62
  320  E11        REAL                          REFS        47        49  DEFINED        45
  321  E12        REAL                          REFS        48        50  DEFINED        46
  311  J          INTEGER                       REFS        39        57        58        60  DEFINED        38        56
  313  J1         INTEGER                       REFS        41        43        59        61  DEFINED        40        57
  312  J2         INTEGER                       REFS        40        42        44  DEFINED        39
  235  KTEST      INTEGER                       REFS         5  DEFINED         4         6
    0  REX        REAL                F.P.      REFS        53        80        83  DEFINED         1        36        53
                                                  80        83
  347  SC1        REAL                          REFS        75        76  DEFINED        73
  305  SMZW       REAL                          REFS        34        49        50        73        74
                                             DEFINED        32
  350  SS1        REAL                          REFS        75        76  DEFINED        74
  353  T101       REAL                          REFS        80  DEFINED        77
  335  T11        REAL                          REFS        77        78        79  DEFINED        63
  322  T111       REAL                          REFS        53        81  DEFINED        47        78
  323  T112       REAL                          REFS        53  DEFINED        48
  354  T121       REAL                          REFS        80        81  DEFINED        79
  337  T21        REAL                          REFS        79  DEFINED        65
  324  T211       REAL                          REFS        54  DEFINED        49
  325  T212       REAL                          REFS        54  DEFINED        50
  336  T31        REAL                          REFS        65        77        78  DEFINED        64
  326  T311       REAL                          REFS        53        54  DEFINED        51
  327  T312       REAL                          REFS        53        54  DEFINED        52
  340  T41        REAL                          REFS      2*75        76  DEFINED        66
  341  T51        REAL                          REFS        75        76  DEFINED        67
  342  T61        REAL                          REFS        75      2*76  DEFINED        68
  343  T71        REAL                          REFS        75        76  DEFINED        69
  351  T81        REAL                          REFS        77        78  DEFINED        75
  352  T91        REAL                          REFS        77        78  DEFINED        76
    0  W          REAL                F.P.      REFS        29  DEFINED         1
  301  Z          REAL                          REFS        30        33        34        35        49        50        64
                                                  68        69  DEFINED        28
  306  ZCMZW      REAL                          REFS        49        50  DEFINED        33
    0  ZETA       REAL                F.P.      REFS        28  DEFINED         1
  307  ZSMZW      REAL                          REFS        47        48  DEFINED        34
  310  Z2         REAL                          REFS        51        52        63  DEFINED        35

EXTERNALS          TYPE    ARGS        REFERENCES
       COS         REAL      1 LIBRARY       31        71        73
       EXP         REAL      1 LIBRARY       45        46        62
       SIN         REAL      1 LIBRARY       32        72        74

STATEMENT LABELS             DEF LINE    REFERENCES
   45  1                        27            5
    0  2                        55           38
    0  4                        82           56
```

```
LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   64  2          J         38 55       50B              EXT REFS
  135  4          J         56 82       75B              EXT REFS

STATISTICS
  PROGRAM LENGTH                   407B      263
          52000B CM USED
```

```
      SUBROUTINE GRS (QR, QI,LL,BIR,BII)                                 GRS     2
C                                                                        GRS     3
      DIMENSION     BIR(25, 1) ,   BII(25, 1)                            GRS     4
      DIMENSION      QR(20,20) ,    QI(20,20)                            GRS     5
      DIMENSION      ALPHA(100,20)                                       GRS     6
      DIMENSION      CHR  (100,20)                                       GRS     7
      DIMENSION      HR   (200,20)                                       GRS     8
      DIMENSION GETA(25)                                                 GRS     9
      DIMENSION ITAPES(50)                                               GRS    10
      COMPLEX AIC(100,25), CDW(100,20)                                   GRS    11
      COMMON /COMA/ LC(40) , BR                                          GRS    12
      COMMON /COMB  / ISI,M,IRR,N,ISS,LIRA,NO1,NO2,NMOD,ABO,ALO,M2       GRS    13
      COMMON/COMD/X(10),Y(10),XMW(10),RBBO(10),XII(20),XI(60),ETA(100),  GRS    14
     1XIMW(100),SBBO(100)                                                GRS    15
      COMMON/COMF/MCC,NLRR,NNP,Z2A                                       GRS    16
      COMMON/COMI/ZK,ZKX,YOE,YOEX                                        GRS    17
      COMMON/COMJ/ZM                                                     GRS    18
      COMMON / CTAPES / ITAPES                                           GRS    19
      EQUIVALENCE (ALPHA(1,1),HR(1,1)), (CHR(1,1),HR(1,11))              GRS    20
C                                                                        GRS    21
C                                                                        GRS    22
      ITAPEW = ITAPES(6)                                                 GRS    23
      MTAP2  =  ITAPES(22)                                               GRS    24
      MTAP10 =  ITAPES(30)                                               GRS    25
      MTAP11 =  ITAPES(31)                                               GRS    26
C                                                                        GRS    27
C                                                                        GRS    28
      LC12  =  LC(22)                                                    GRS    29
      NS=NMOD                                                            GRS    30
      IF (LC(33).NE.0.OR.LC(1).EQ.2)    ZK = 0.0                         GRS    31
      NN=NO1                                                             GRS    32
      MM = M                                                             GRS    33
      AQ = (4*MM+1)*(IRR+1)                                              GRS    34
      PIF = 3.1415927                                                    GRS    35
      TINT = 2.0*PIF*PIF/AQ                                              GRS    36
      IF(ZK.EQ.0.0)GO TO 200                                             GRS    37
      CONST = ALO/ZK*ABO/BR                                              GRS    38
      CONSTA =-CONST*CONST/BR*TINT                                       GRS    39
  200 CONSS = 8.0*ALO*ALO*TINT                                           GRS    40
      CONSS = 0.5*CONSS                                                  GRS    41
      IF(ZK.EQ.0.0)GO TO 201                                             GRS    42
      BR4 = 4.0*BR*BR*BR                                                 GRS    43
      CONSTA = BR4*CONSTA                                                GRS    44
  201 ZKB = ZK/ABO                                                       GRS    45
C                                                                        GRS    46
      MLR = MM*LIRA                                                      GRS    47
      MLR2 = MLR+MLR                                                     GRS    48
      MAMM = MM                                                          GRS    49
      LIRR = NLRR                                                        GRS    50
C     MATRIX MULTIPLICATION - POLYNOMIAL COEFFICIENTS                    GRS    51
      KLUE = NS                                                          GRS    52
C     CHECK TO SEE IF FACTORIZATION HAS BEEN COMPLETED                   GRS    53
      IF (LC12.NE.0) KLUE = - NS                                         GRS    54
      IF (LC12.EQ.0) GO TO 73                                            GRS    55
      READ(MTAP11) AIC                                                   GRS    56
      READ(MTAP11) GETA                                                  GRS    57
      GO TO 75                                                           GRS    58
```

```
VARIABLES      SN  TYPE            RELOCATION
    O  A2          REAL       ARRAY      F.P.      REFS        3   DEFINED      1      11      12      13      14
                                                     15       16        17
    O  A5          REAL       ARRAY      F.P.      REFS        3   DEFINED      1      18      19      20      21
                                                     22       23        24     25      26      27      28
    O  A6          REAL       ARRAY      F.P.      REFS        3   DEFINED      1      29      30      31      32
                                                     33       34        35     36      37      38      39
    O  A8          REAL       ARRAY      F.P.      REFS        3   DEFINED      1      40      41      42      43
                                                     44       45
    O  C2          REAL       ARRAY      F.P.      REFS        3   DEFINED      1       4       5       6       7
                                                      8        9        10

STATISTICS
  PROGRAM LENGTH                206B      134
          52000B CM USED
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

      5      I       C2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
      6      I       C2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
      7      I       C2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
      8      I       C2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
      9      I       C2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     10      I       C2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     12      I       A2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     13      I       A2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     14      I       A2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     15      I       A2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     16      I       A2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     17      I       A2        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     19      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     20      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     21      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     22      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     23      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     24      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     25      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     26      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     27      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     28      I       A5        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     30      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     31      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     32      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     33      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     34      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     35      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     36      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     37      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     38      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     39      I       A6        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     41      I       A8        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     42      I       A8        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     43      I       A8        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     44      I       A8        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     45      I       A8        ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     47      I       A10       ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     48      I       A10       ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     49      I       A10       ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     50      I       A10       ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
     51      I       A10       ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.


       SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
    3  PARAM1          1           52

 VARIABLES     SN  TYPE           RELOCATION
    0  A10         REAL       ARRAY     F.P.        REFS        3   DEFINED       1        46        47        48        49
                                                       50          51
```

```
      SUBROUTINE  PARAM1 (C2,A2,A5,A6,A8,A10)                      PARAM1    2
C                                                                  PARAM1    3
      DIMENSION  C2(1),A2(1),A5(1),A6(1),A8(1),A10(1)              PARAM1    4
      C2(1)=- .2084718313E-03                                      PARAM1    5
      C2(2)=- .3487065945                                          PARAM1    6
      C2(3)=- .1890378526                                          PARAM1    7
      C2(4)=- .7583855332E-01                                      PARAM1    8
      C2(5)=- .2122355710E-01                                      PARAM1    9
      C2(6)=  .6350150293                                          PARAM1   10
      C2(7)=  .2890418545E-21                                      PARAM1   11
      A2(1)=- .1903231342E+01                                      PARAM1   12
      A2(2)=- .1176831521E+01                                      PARAM1   13
      A2(3)=- .8592458597                                          PARAM1   14
      A2(4)=- .4965823037                                          PARAM1   15
      A2(5)=- .2113879894                                          PARAM1   16
      A2(6)=  .6879924569E-04                                      PARAM1   17
      A2(7)=  .2441971770E+01                                      PARAM1   18
      A5(1)=    .1299451189E+03                                    PARAM1   19
      A5(2)=    .1813126160E+03                                    PARAM1   20
      A5(3)=    .6939591763E+02                                    PARAM1   21
      A5(4)=    .1633455055E+02                                    PARAM1   22
      A5(5)=    .2571459906E+01                                    PARAM1   23
      A5(6)=    .2878555118                                        PARAM1   24
      A5(7)=    .0239930791                                        PARAM1   25
      A5(8)=    .0015430190                                        PARAM1   26
      A5(9)=    .0000787567                                        PARAM1   27
      A5(10)=   .0000032641                                        PARAM1   28
      A5(11)=   .0000001119                                        PARAM1   29
      A6(1)= -  .1334404774E+02                                    PARAM1   30
      A6(2)= -  .1839239224E+01                                    PARAM1   31
      A6(3)=    .9361617831E+01                                    PARAM1   32
      A6(4)=    .4666387027E+01                                    PARAM1   33
      A6(5)=    .1101461993E+01                                    PARAM1   34
      A6(6)=    .1610743017                                        PARAM1   35
      A6(7)=    .0163000493                                        PARAM1   36
      A6(8)=    .0012170570                                        PARAM1   37
      A6(9)=    .0000700106                                        PARAM1   38
      A6(10)=   .0000032025                                        PARAM1   39
      A6(11)=   .0000001194                                        PARAM1   40
      A8(1)=- .1996057005E+01                                      PARAM1   41
      A8(2)=  .39558508E-02                                        PARAM1   42
      A8(3)=  .133895E-04                                          PARAM1   43
      A8(4)=  .7446E-06                                            PARAM1   44
      A8(5)=  .3227E-06                                            PARAM1   45
      A8(6)=  .1663E-06                                            PARAM1   46
      A10(1)=   .3985713852                                        PARAM1   47
      A10(2)=-  .187627251E-01                                     PARAM1   48
      A10(3)=-  .3728518E-03                                       PARAM1   49
      A10(4)=-  .211985E-04                                        PARAM1   50
      A10(5)=-  .20039E-05                                         PARAM1   51
      A10(6)=-  .2729E-06                                          PARAM1   52
      RETURN                                                       PARAM1   53
       END                                                         PARAM1   54
```

```
EXTERNALS          TYPE    ARGS         REFERENCES
      SQRT       REAL       1 LIBRARY      58

STATEMENT LABELS               DEF LINE   REFERENCES
   13  1                           9          5
    0  2                          16         14
    0  3                          33         25
  115  4                          38         10
    0  6                          45         41
  143  7                          48         19
    0  8                          56         52
  177  9                          60          8         37

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   23  2          L          14 16        11B                  EXT REFS
   63  3          L          25 33        13B         OPT
  127  6          L          41 45         7B       INSTACK
  154  8          L          52 56         7B       INSTACK

STATISTICS
  PROGRAM LENGTH                  335B      221
          52000B CM USED
```

```
                     EFACT=3.1415927*(EXP(-X)/SQRT(X))                    SPCLA      59
                     EK1=EFACT*EK1                                        SPCLA      60
  60               9 RETURN                                               SPCLA      61
                      END                                                 SPCLA      62



       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  SPCLA          1          60

VARIABLES      SN  TYPE            RELOCATION
  325  A10         REAL      ARRAY              REFS       3        9       50       51       55
  262  A2          REAL      ARRAY              REFS       3        9       16       18
  271  A5          REAL      ARRAY              REFS       3        9       21       22       28
  304  A6          REAL      ARRAY              REFS       3        9       23       24       31
  317  A8          REAL      ARRAY              REFS       3        9       39       40       44
  251  C10DUM      REAL                         REFS      56  DEFINED       54
  247  C101        REAL                         REFS      54       55       57  DEFINED       50       56
  250  C102        REAL                         REFS      54       57  DEFINED       51       55
  253  C2          REAL      ARRAY              REFS       3        9       16       18
  241  C5DUM       REAL                         REFS      29  DEFINED       27
  234  C51         REAL                         REFS      27       28       34  DEFINED       21       29
  235  C52         REAL                         REFS      27       34  DEFINED       22       28
  242  C6DUM       REAL                         REFS      32  DEFINED       30
  236  C61         REAL                         REFS      30       31       35  DEFINED       23       32
  237  C62         REAL                         REFS      30       35  DEFINED       24       31
  246  C8DUM       REAL                         REFS      45  DEFINED       43
  244  C81         REAL                         REFS      43       44       46  DEFINED       39       45
  245  C82         REAL                         REFS      43       46  DEFINED       40       44
  252  EFACT       REAL                         REFS      59  DEFINED       58
    0  EIL1        REAL           F.P.          REFS      16       18       47  DEFINED        1        6       13
                                                  16      18       46       47
  243  EI1         REAL                         REFS      36  DEFINED       34
    0  EK1         REAL           F.P.          REFS      36       59  DEFINED        1        7       35       36
                                                  57      59
  233  FX          REAL                         REFS      27       30       34       35       43       46       49
                                                  54      57  DEFINED       20       38       48       49
  226  GINV        REAL                         REFS      12  DEFINED       11
  230  L           INTEGER                      REFS      15       26       42       53  DEFINED       14       25
                                                  41      52
  231  L1          INTEGER                      REFS    2*16  DEFINED       15
  240  NM3         INTEGER                      REFS      28       31       44       55  DEFINED       26       42
                                                  53
  232  PI          REAL                         REFS      18  DEFINED       17
    0  X           REAL           F.P.          REFS       5       10       12       19       20     4*36       38
                                                  48    2*58  DEFINED        1
  227  YOVH        REAL                         REFS      16     2*18  DEFINED       12

EXTERNALS          TYPE    ARGS        REFERENCES
       ALOG        REAL      1 LIBRARY     36
       COS         REAL      1 LIBRARY     18
       EXP         REAL      1 LIBRARY     16       18       58
       PARAM1                6              9
```

```
      SUBROUTINE  SPCLA (X,EIL1,EK1)                                   SPCLA     2
C                                                                      SPCLA     3
      DIMENSION  C2(7),A2(7),A5(11),A6(11),                            SPCLA     4
     1A8(6),A10(6)                                                     SPCLA     5
      IF (X.LT.100) GO TO 1                                            SPCLA     6
      EIL1 = 0.0                                                       SPCLA     7
      EK1  = 0.0                                                       SPCLA     8
      GO TO 9                                                          SPCLA     9
    1 CALL PARAM1 (C2,A2,A5,A6,A8,A10)                                 SPCLA    10
      IF (X.GT.16.0) GO TO 4                                           SPCLA    11
      GINV=0.8125                                                      SPCLA    12
      YOVH=X*GINV                                                      SPCLA    13
      EIL1=0.0                                                         SPCLA    14
      DO  2    L=2,7                                                   SPCLA    15
      L1=L-1                                                           SPCLA    16
    2 EIL1=EIL1+C2(L1)*EXP(A2(L1)*YOVH)                                SPCLA    17
      PI=3.141592654                                                   SPCLA    18
      EIL1=EIL1+C2(7)*EXP(A2(7)*YOVH)*COS(PI*YOVH)                     SPCLA    19
      IF(X.GT.8.0)  GO TO  7                                           SPCLA    20
      FX=(X**2/16.0)-2.0                                               SPCLA    21
      C51=A5(11)                                                       SPCLA    22
      C52=A5(10)                                                       SPCLA    23
      C61=A6(11)                                                       SPCLA    24
      C62=A6(10)                                                       SPCLA    25
      DO  3    L=1,9                                                   SPCLA    26
      NM3=10-L                                                         SPCLA    27
      C5DUM=FX*C51+C52                                                 SPCLA    28
      C52=A5(NM3)-C51                                                  SPCLA    29
      C51=C5DUM                                                        SPCLA    30
      C6DUM=FX*C61+C62                                                 SPCLA    31
      C62=A6(NM3)-C61                                                  SPCLA    32
      C61=C6DUM                                                        SPCLA    33
    3 CONTINUE                                                         SPCLA    34
      EI1=0.5*FX*C51+C52                                               SPCLA    35
      EK1=0.5*FX*C61+C62                                               SPCLA    36
      EK1=(X/8.0)*EI1*ALOG(X/8.)+(1.0/X)-(X/8.0)*EK1                   SPCLA    37
      GO TO 9                                                          SPCLA    38
    4 FX=(1024.0/X**2)-2.0                                             SPCLA    39
      C81=A8(6)                                                        SPCLA    40
      C82=A8(5)                                                        SPCLA    41
      DO  6    L=1,4                                                   SPCLA    42
      NM3=5-L                                                          SPCLA    43
      C8DUM=FX*C81+C82                                                 SPCLA    44
      C82=A8(NM3)-C81                                                  SPCLA    45
    6 C81=C8DUM                                                        SPCLA    46
      EIL1=0.5*FX*C81+C82                                              SPCLA    47
      EIL1=(-0.318309886)*EIL1                                         SPCLA    48
    7 FX=16.0/X                                                        SPCLA    49
      FX=-FX                                                           SPCLA    50
      C101=A10(6)                                                      SPCLA    51
      C102=A10(5)                                                      SPCLA    52
      DO  8    L=1,4                                                   SPCLA    53
      NM3=5-L                                                          SPCLA    54
      C10DUM=( FX)*C101+C102                                           SPCLA    55
      C102=A10(NM3)-C101                                               SPCLA    56
    8 C101=C10DUM                                                      SPCLA    57
      EK1=0.5*( FX)*C101+C102                                          SPCLA    58
```

```
      SUBROUTINE CONA       74/74    OPT=1                        FTN 4.8+577       85/01/23. 08.10.44        PAGE     1

   1                SUBROUTINE CONA(RE1,RI2,RI3)                                         CONA          2
              C                                                                          CONA          3
                    COMMON/COMI/ZK,ZKX,YOE,YOEX                                          CONA          4
                    YOE = ABS(YOE)                                                       CONA          5
   5                Z = YOE*ZK                                                           CONA          6
                    CALL SPCLA(Z,SKER2,FMBF2)                                            CONA          7
                    RE1=-1.0/Z*FMBF2                                                     CONA          8
                    RI2=-3.14159/(2.0*Z)*SKER2                                           CONA          9
                    RI3 = 1.0/Z                                                          CONA         10
  10                RETURN                                                               CONA         11
                     END                                                                 CONA         12


      SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  CONA           1           10

 VARIABLES      SN  TYPE            RELOCATION
    32  FMBF2       REAL                          REFS         6         7
     0  RE1         REAL               F.P.     DEFINED        1         7
     0  RI2         REAL               F.P.     DEFINED        1         8
     0  RI3         REAL               F.P.     DEFINED        1         9
    31  SKER2       REAL                          REFS         6         8
     2  YOE         REAL              COMI        REFS         3         4         5    DEFINED        4
     3  YOEX        REAL              COMI        REFS         3
    30  Z           REAL                          REFS         6         7         8         9    DEFINED        5
     0  ZK          REAL              COMI        REFS         3         5
     1  ZKX         REAL              COMI        REFS         3

 EXTERNALS           TYPE    ARGS         REFERENCES
        SPCLA                  3               6

 INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
        ABS         REAL       1  INTRIN                  4

 COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
        COMI          4                 0 ZK      (1)              1 ZKX     (1)                  2 YOE     (1)
                                        3 YOEX    (1)

 STATISTICS
   PROGRAM LENGTH                  33B       27
   CM LABELED COMMON LENGTH         4B        4
           52000B CM USED
```

```
LOOPS  LABEL    INDEX    FROM-TO    LENGTH   PROPERTIES
   43  100      K          26 27        6B              EXT REFS
   77  2        J          43 54       33B              EXT REFS

STATISTICS
  PROGRAM LENGTH                262B      178
         52000B CM USED
```

```
                    END                                                               QUAYB      59


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  QUAYB          1           57

VARIABLES     SN  TYPE            RELOCATION
  237  A1          REAL      ARRAY                 REFS        3       27       44  DEFINED       16       17       18
                                                              19       20       21       22       23
  220  A1J         REAL                            REFS       46     2*49     2*50       51  DEFINED       44
  205  CMZW        REAL                            REFS       33       49  DEFINED       31
  227  C1          REAL      ARRAY                 REFS        3       45  DEFINED        8        9       10       11
                                                              12       13       14       15
  221  C1J         REAL                            REFS       52       53  DEFINED       45
  213  C2Z         REAL                            REFS       39       49  DEFINED       37
  177  EM          REAL                            REFS       28       29       55       56  DEFINED       24
  203  EMW         REAL                            REFS       30       46  DEFINED       29
    0  EMX         REAL                 F.P.       REFS       53       56  DEFINED        1       42       53       56
  204  EMZW        REAL                            REFS       31       32  DEFINED       30
  222  E1          REAL                            REFS       48       49       50  DEFINED       46       48
  247  E1MA        REAL      ARRAY                 REFS        3       47  DEFINED       27
  223  E1MAJ       REAL                            REFS       48  DEFINED       47
  217  J           INTEGER                         REFS       44       45       47  DEFINED       43
  201  K           INTEGER                         REFS     2*27  DEFINED       26
  135  KTEST       INTEGER                         REFS        6  DEFINED        5        7
    0  REX         REAL                 F.P.       REFS       52       55  DEFINED        1       41       52       55
  206  SMZW        REAL                            REFS       34       50  DEFINED       32
  214  S2Z         REAL                            REFS       40       50  DEFINED       38
  200  TWOM        REAL                            REFS       27  DEFINED       25
  212  TWOZ        REAL                            REFS       37       38  DEFINED       36
  224  T11         REAL                            REFS       52  DEFINED       49
  225  T12         REAL                            REFS       53  DEFINED       50
  226  T13         REAL                            REFS       52       53  DEFINED       51
    0  W           REAL                 F.P.       REFS       29  DEFINED        1
  202  Z           REAL                            REFS       30       33       34       35       39       40
                                                DEFINED       28
  207  ZCMZW       REAL                            REFS       50  DEFINED       33
  215  ZC2Z        REAL                            REFS       50  DEFINED       39
    0  ZETA        REAL                 F.P.       REFS       28       36  DEFINED        1
  210  ZSMZW       REAL                            REFS       49  DEFINED       34
  216  ZS2Z        REAL                            REFS       49  DEFINED       40
  211  Z2          REAL                            REFS       51  DEFINED       35

EXTERNALS          TYPE    ARGS        REFERENCES
       COS         REAL      1 LIBRARY     31       37
       EXP         REAL      1 LIBRARY     27       46
       SIN         REAL      1 LIBRARY     32       38

STATEMENT LABELS             DEF LINE   REFERENCES
   51  1                        28          6
    0  2                        54         43
    0  100                      27         26
```

```
      SUBROUTINE QUAYB(W,ZETA,REX,EMX)
C
      DIMENSION   C1(8),A1(8)
     1,E1MA(8)
      DATA   KTEST/0/
      IF(KTEST.EQ.1)  GO  TO  1
      KTEST=1
      C1(1)= - .12537317E-02
      C1(2)= - .13001848E-02
      C1(3)= - .10328237E-02
      C1(4)= - .19255807E-03
      C1(5)= - .70596083E-03
      C1(6)= - .41160917E-03
      C1(7)= - .60961111E-04
      C1(8)=   .99999502E+00
      A1(1)= - .46040156E+01
      A1(2)= - .26084536E+01
      A1(3)= - .16477373E+01
      A1(4)= - .33591611E+00
      A1(5)= - .10418700E+01
      A1(6)= - .62626206E+00
      A1(7)= - .13899640E+00
      A1(8)=   .89071555E-07
      EM=  .078947368
      TWOM= .78947368
      DO  100  K=1,8
  100 E1MA(K)=EXP(TWOM*A1(K))
    1 Z=ZETA/EM
      EMW=EM*W
      EMZW=EMW*Z
      CMZW=COS(EMZW)
      SMZW=SIN(EMZW)
      ZCMZW=Z*CMZW
      ZSMZW=Z*SMZW
      Z2=Z**2
      TWOZ=10 *ZETA
      C2Z=COS(TWOZ)
      S2Z=SIN(TWOZ)
      ZC2Z=Z*C2Z
      ZS2Z=Z*S2Z
      REX=0 0
      EMX=0 0
      DO  2    J=1,8
      A1J=A1(J)
      C1J=C1(J)
      E1=EXP(A1J*EMW)
      E1MAJ=E1MA(J)
      E1=E1/E1MAJ
      T11=E1*(A1J*CMZW+ZSMZW)-      (A1J*C2Z+ZS2Z)
      T12=E1*(ZCMZW-A1J*SMZW)-      (ZC2Z-A1J*S2Z)
      T13=A1J**2+Z2
      REX=REX+C1J*(T11/T13)
      EMX=EMX+C1J*(T12/T13)
    2 CONTINUE
      REX=REX  /EM
      EMX=EMX  /EM
      RETURN
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
    0  100                          27          26

LOOPS  LABEL    INDEX       FROM-TO    LENGTH    PROPERTIES
   43  100      K             26 27        6B             EXT REFS
   77  2        J             43 54       33B             EXT REFS

STATISTICS
  PROGRAM LENGTH                   260B      176
          52000B CM USED
```

```
                END                                                                      QUAXA      59



       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE       REFERENCES
    3  QUAXA           1            57

VARIABLES       SN  TYPE          RELOCATION
  235  A1           REAL       ARRAY                   REFS         3       27       44   DEFINED      16       17       18
                                                         19        20       21       22       23
  216  A1J          REAL                               REFS        46     2*49     2*50       51   DEFINED       44
  203  CMZW         REAL                               REFS        33       49  DEFINED       31
  225  C1           REAL       ARRAY                   REFS         3       45  DEFINED        8        9       10       11
                                                         12        13       14       15
  217  C1J          REAL                               REFS        52       53  DEFINED       45
  211  C2Z          REAL                               REFS        39       49  DEFINED       37
  175  EM           REAL                               REFS        25       28       29       55       56
                                                    DEFINED        24
  201  EMW          REAL                               REFS        30       46  DEFINED       29
    0  EMX          REAL                  F.P.         REFS        53       56  DEFINED        1       42       53       56
  202  EMZW         REAL                               REFS        31       32  DEFINED       30
  220  E1           REAL                               REFS        48       49       50   DEFINED      46       48
  245  E1MA         REAL       ARRAY                   REFS         3       47  DEFINED       27
  221  E1MAJ        REAL                               REFS        48  DEFINED       47
  215  J            INTEGER                            REFS        44       45       47   DEFINED      43
  177  K            INTEGER                            REFS      2*27  DEFINED       26
  135  KTEST        INTEGER                            REFS         6  DEFINED        5        7
    0  REX          REAL                  F.P.         REFS        52       55  DEFINED        1       41       52       55
  204  SMZW         REAL                               REFS        34       50  DEFINED       32
  212  S2Z          REAL                               REFS        40       50  DEFINED       38
  176  TWOM         REAL                               REFS        27  DEFINED       25
  210  TWOZ         REAL                               REFS        37       38  DEFINED       36
  222  T11          REAL                               REFS        52  DEFINED       49
  223  T12          REAL                               REFS        53  DEFINED       50
  224  T13          REAL                               REFS        52       53  DEFINED       51
    0  W            REAL                  F.P.         REFS        29  DEFINED        1
  200  Z            REAL                               REFS        30       33       34       35       39       40
                                                    DEFINED        28
  205  ZCMZW        REAL                               REFS        50  DEFINED       33
  213  ZC2Z         REAL                               REFS        50  DEFINED       39
    0  ZETA         REAL                  F.P.         REFS        28       36  DEFINED        1
  206  ZSMZW        REAL                               REFS        49  DEFINED       34
  214  ZS2Z         REAL                               REFS        49  DEFINED       40
  207  Z2           REAL                               REFS        51  DEFINED       35

EXTERNALS           TYPE    ARGS         REFERENCES
       COS          REAL      1 LIBRARY      31        37
       EXP          REAL      1 LIBRARY      27        46
       SIN          REAL      1 LIBRARY      32        38

STATEMENT LABELS               DEF LINE     REFERENCES
   51  1                          28           6
    0  2                          54          43
```

```
      SUBROUTINE QUAXA(W,ZETA,REX,EMX)                          QUAXA    2
C                                                               QUAXA    3
      DIMENSION   C1(8),A1(8)                                   QUAXA    4
     1,E1MA(8)                                                  QUAXA    5
      DATA   KTEST/O/                                           QUAXA    6
      IF(KTEST.EQ.1)  GO  TO  1                                 QUAXA    7
      KTEST=1                                                   QUAXA    8
      C1(1)=+0.126989568E-04                                    QUAXA    9
      C1(2)=- .184120917E-02                                    QUAXA   10
      C1(3)=- .961312933E-02                                    QUAXA   11
      C1(4)=- .225760657E-01                                    QUAXA   12
      C1(5)=- .310946110E-01                                    QUAXA   13
      C1(6)=- .265378242E-01                                    QUAXA   14
      C1(7)=- .126056180E-01                                    QUAXA   15
      C1(8)=  .998682949                                        QUAXA   16
      A1(1)=- .290031996E+01                                    QUAXA   17
      A1(2)=- .144624003E+01                                    QUAXA   18
      A1(3)=- .100501888E+01                                    QUAXA   19
      A1(4)=- .670766121E+00                                    QUAXA   20
      A1(5)=- .417168640E+00                                    QUAXA   21
      A1(6)=- .228819077E+00                                    QUAXA   22
      A1(7)=- .960618034E-01                                    QUAXA   23
      A1(8)=  .170972326E-04                                    QUAXA   24
      EM=1.875                                                  QUAXA   25
      TWOM=2.0*EM                                               QUAXA   26
      DO  100  K=1,8                                            QUAXA   27
  100 E1MA(K)=EXP(TWOM*A1(K))                                   QUAXA   28
    1 Z=ZETA/EM                                                 QUAXA   29
      EMW=EM*W                                                  QUAXA   30
      EMZW=EMW*Z                                                QUAXA   31
      CMZW=COS(EMZW)                                            QUAXA   32
      SMZW=SIN(EMZW)                                            QUAXA   33
      ZCMZW=Z*CMZW                                              QUAXA   34
      ZSMZW=Z*SMZW                                              QUAXA   35
      Z2=Z**2                                                   QUAXA   36
      TWOZ=2.0*ZETA                                             QUAXA   37
      C2Z=COS(TWOZ)                                             QUAXA   38
      S2Z=SIN(TWOZ)                                             QUAXA   39
      ZC2Z=Z*C2Z                                                QUAXA   40
      ZS2Z=Z*S2Z                                                QUAXA   41
      REX=0.0                                                   QUAXA   42
      EMX=0.0                                                   QUAXA   43
      DO  2    J=1,8                                            QUAXA   44
      A1J=A1(J)                                                 QUAXA   45
      C1J=C1(J)                                                 QUAXA   46
      E1=EXP(A1J*EMW)                                           QUAXA   47
      E1MAJ=E1MA(J)                                             QUAXA   48
      E1=E1/E1MAJ                                               QUAXA   49
      T11=E1*(A1J*CMZW+ZSMZW)-      (A1J*C2Z+ZS2Z)              QUAXA   50
      T12=E1*(ZCMZW-A1J*SMZW)-      (ZC2Z-A1J*S2Z)              QUAXA   51
      T13=A1J**2+Z2                                             QUAXA   52
      REX=REX+C1J*(T11/T13)                                     QUAXA   53
      EMX=EMX+C1J*(T12/T13)                                     QUAXA   54
    2 CONTINUE                                                  QUAXA   55
      REX=REX  /EM                                              QUAXA   56
      EMX=EMX  /EM                                              QUAXA   57
      RETURN                                                    QUAXA   58
```

```
   73 READ (MTAP10) AIC
      REWIND MTAP10
   75 DO 2  J=1,NMOD
      CALL RNRW (-MTAP2,CHR(1,J),NO1)
    2 CALL RNRW (-MTAP2,ALPHA(1,J),NO1)
      DO 72 I =1,NN
      DO 72 J =1,NS
      ZHR = ZKB * CHR(I,J)
   72 CDW(I,J) = CMPLX (ALPHA(I,J),ZHR)
      NIX  =  O
      CALL CLSQ (AIC,NN,NNP,CDW,KLUE,GETA,100,NIX)
      IF (NIX.NE.O) GOTO 500
      IF (LC12.NE.O) GOTO 1
      WRITE(MTAP11) AIC
      WRITE(MTAP11) GETA
    1 DO 109 I=1,NNP
      DO 109 J =1,NS
      BIR(I,J) = REAL(CDW(I,J))
      BII(I,J) =AIMAG(CDW(I,J))
      IF(ZK.EQ.O.O)BII(I,J)=O.O
  109 CONTINUE
C
C
      DO 3  J=1,NMOD
    3 CALL RNRW (-MTAP2,HR(1,J),NO2)
      M2 = MM + MM
      MM = MCC
      MLR = NNP
C     GENERALIZED AERODYNAMIC FORCES
      DO 5 I =1,NS
      DO 5 J =1,NS
      QR(I,J) = O.O
      QI(I,J) = O.O
      DO 6 L1 = 1,MLR
      L=1+(L1-1)/LIRR
      K=L1-(L-1)*LIRR
      NU = 2*(K-1) + LL
      DO 6 N1 = 1,MLR2
      J1 = (N1-1)/M2 + 1
      I1 = N1 - (J1-1)*M2
      AD = HR(N1,I)*(1.O-Y(J1)**2)*(1.O-XII(I1)**2)*Y(J1)**NU
      IF (L-1) 7,7,8
    7 AD = AD/(1.O+XII(I1))
      GO TO 9
    8 AD = AD*XII(I1)**(L-2)
    9 QR(I,J) = QR(I,J) + AD*BIR(L1,J)
      IF (ZK) 6,6,10
   10 QI(I,J) = QI(I,J) + AD*BII(L1,J)
    6 CONTINUE
      IF (ZK) 12,12,13
   12 QR(I,J) = CONSS*QR(I,J)
      GO TO 5
   13 QR(I,J) = CONSTA*QR(I,J)
      QI(I,J) = CONSTA*QI(I,J)
    5 CONTINUE
      IF (LC(6) .EQ. O )     GO TO 82
      LINE=O
```

```
      DO 80 J=1,NS                                                     GRS  116
      IF(LINE.EQ.O)WRITE (ITAPEW,81)ISI,ZM,ZK                          GRS  117
      NONP = NNP/3                                                     GRS  118
      NDNP = NNP-3*NNP                                                 GRS  119
      IF(NDNP.NE.O)NONP=NONP+1                                         GRS  120
      NONP=NONP+2                                                      GRS  121
      LINE=LINE+NONP                                                   GRS  122
      IF(LINE.GT.50)LINE=O                                             GRS  123
      WRITE (ITAPEW,38)J                                               GRS  124
      WRITE (ITAPEW,39)(BIR(I,J), BII(I,J),I=1,NNP)                    GRS  125
   80 CONTINUE                                                         GRS  126
      WRITE (ITAPEW,40) ISI, ZM, ZK                                    GRS  127
      LINE = 8                                                         GRS  128
      KONS = NS + NS/3 - 3*(NS/3) + 1                                  GRS  129
      DO 41 I=1,NS                                                     GRS  130
      LINE = LINE + KONS                                               GRS  131
      IF (LINE.LE.62)  GO TO 41                                        GRS  132
      LINE = 8 + KONS                                                  GRS  133
      WRITE (ITAPEW,40) ISI , ZM , ZK                                  GRS  134
   41 WRITE (ITAPEW,42)(QR(I,J),QI(I,J),J=1,NS)                        GRS  135
   82 M=MAMM                                                           GRS  136
      GO TO 550                                                        GRS  137
  500 WRITE (ITAPEW,501)                                               GRS  138
      STOP                                                             GRS  139
C                                                                      GRS  140
C                                                                      GRS  141
C FORMATS                                                              GRS  142
C                                                                      GRS  143
   38 FORMAT(I5)                                                       GRS  144
   39 FORMAT(/( T8,1PE10.3,T20,1PE10.3, T6,2H (,T18,2H, , T30,2H) ,    GRS  145
     1          T34,1PE10.3,T46,1PE10.3,T32,2H (,T44,2H, , T56,2H) ,   GRS  146
     2         T60,1PE10.3,T72,1PE10.3,T58,2H (,T70,2H, , T82,2H) ))   GRS  147
   40 FORMAT (1H1,5X13HSURFACE NO. =,I3,/5X10HMACH NO. =,E10.3 /5X     GRS  148
     1        19HREDUCED FREQUENCY =,E10.3/5X                          CRS  149
     2        40HGENERALIZED AIR FORCES WITHOUT ADDITIONS,/15X         GRS  150
     3        16H(REAL,IMAGINARY), //)                                 GRS  151
   42 FORMAT(/( T3,1PE10.3,T15,1PE10.3, T1,2H (,T13,2H, , T25,2H) ,    GRS  152
     1         T29,1PE10.3,T41,1PE10.3,T27,2H (,T39,2H, , T51,2H) ,    GRS  153
     2         T55,1PE10.3,T67,1PE10.3,T53,2H (,T65,2H, ,T77,2H) ))    GRS  154
   81 FORMAT (1H1,5X13HSURFACE NO. =,I3,/5X10HMACH NO. =,E10.3 /5X     GRS  155
     1        19HREDUCED FREQUENCY =,E10.3/5X23HPOLYNOMIAL COEFFICIENTS, GRS  156
     2        /1X4HMODE,10X11H(REAL,IMAG), /)                          GRS  157
  501 FORMAT (1H1,4X20HNO SOLUTION POSSIBLE,//5X20HCHECK INPUT DATA****) GRS  158
C                                                                      GRS  159
  550 RETURN                                                           GRS  160
       END                                                             GRS  161
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 GRS	1	159

```
VARIABLES     SN  TYPE            RELOCATION
     11  ABO       REAL               COMB       REFS       12        37        44
    721  AD        REAL                          REFS      100       102       103       105   DEFINED        98       100
                                                  102
  10617  AIC       COMPLEX    ARRAY              REFS       10        68        71   DEFINED        55        58
     12  ALO       REAL               COMB       REFS       12        37      2*39
    726  ALPHA     REAL       ARRAY              REFS        5        19        62        66
    671  AQ        REAL                          REFS       35   DEFINED        33
      0  BII       REAL       ARRAY   F.P.       REFS        3       105       124   DEFINED         1        76        77
      0  BIR       REAL       ARRAY   F.P.       REFS        3       103       124   DEFINED         1        75
     50  BR        REAL               COMA       REFS       11        37        38      3*42
    677  BR4       REAL                          REFS       43   DEFINED        42
  22427  CDW       COMPLEX    ARRAY              REFS       10        68        75        76   DEFINED        66
   4646  CHR       REAL       ARRAY              REFS        6        19        61        65
    676  CONSS     REAL                          REFS       40       108   DEFINED        39        40
    674  CONST     REAL                          REFS     2*38   DEFINED        37
    675  CONSTA    REAL                          REFS       43       110       111   DEFINED        38        43
    170  ETA       REAL       ARRAY   COMD       REFS       13
  10566  GETA      REAL       ARRAY              REFS        8        68        72   DEFINED        56
    726  HR        REAL       ARRAY              REFS        7      2*19        82        98
    707  I         INTEGER                       REFS       65      2*66      2*75      2*76        77        89        90
                                                   98    2*103     2*105     2*108     2*110     2*111     2*124     2*134
                                              DEFINED       63        73        87       124       129
      2  IRR       INTEGER            COMB       REFS       12        33
      0  ISI       INTEGER            COMB       REFS       12       116       126       133
      4  ISS       INTEGER            COMB       REFS       12
      0  ITAPES    INTEGER    ARRAY   CTAPES     REFS        9        18        22        23        24        25
    661  ITAPEW    INTEGER                    DEFINED       22  I/O REFS       116       123       124       126       133
                                                  134      137
    720  I1        INTEGER                       REFS       98       100       102   DEFINED        97
    706  J         INTEGER                       REFS       61        62        65      2*66      2*75      2*76        77
                                                   82       89        90     3*103     3*105     2*108     2*110     2*111
                                                  123    2*124     2*134   DEFINED        60        64        74        81
                                                   88      115       134
    717  J1        INTEGER                       REFS       97      2*98   DEFINED        96
    714  K         INTEGER                       REFS       94   DEFINED        93
    705  KLUE      INTEGER                       REFS       68   DEFINED        51        53
    725  KONS      INTEGER                       REFS      130       132   DEFINED       128
    713  L         INTEGER                       REFS       93        99       102   DEFINED        92
      0  LC        INTEGER    ARRAY   COMA       REFS       11        28      2*30       113
    665  LC12      INTEGER                       REFS       53        54        70   DEFINED        28
    722  LINE      INTEGER                       REFS      116       121       122       130       131
                                              DEFINED      114       121       122       127       130       132
      5  LIRA      INTEGER            COMB       REFS       12        46
    704  LIRR      INTEGER                       REFS       92        93   DEFINED        49
      0  LL        INTEGER            F.P.       REFS       94   DEFINED         1
    712  L1        INTEGER                       REFS       92        93       103       105   DEFINED        91
      1  M         INTEGER            COMB       REFS       12        32   DEFINED       135
    703  MAMM      INTEGER                       REFS      135   DEFINED        48
      0  MCC       INTEGER            COMF       REFS       15        84
    701  MLR       INTEGER                       REFS     2*47        91   DEFINED        46        85
    702  MLR2      INTEGER                       REFS       95   DEFINED        47
    670  MM        INTEGER                       REFS       33        46        48      2*83   DEFINED        32        84
    663  MTAP10    INTEGER                    DEFINED       24  I/O REFS        58        59
    664  MTAP11    INTEGER                    DEFINED       25  I/O REFS        55        56        71        72
    662  MTAP2     INTEGER                       REFS       61        62        82   DEFINED        23
     13  M2        INTEGER            COMB       REFS       12        96        97   DEFINED        83
```

```
VARIABLES      SN  TYPE            RELOCATION
    3  N           INTEGER             COMB       REFS          12
  724  NDNP        INTEGER                        REFS         119     DEFINED       118
  711  NIX         INTEGER                        REFS          68          69   DEFINED        67
    1  NLRR        INTEGER             COMF       REFS          15          49
   10  NMOD        INTEGER             COMB       REFS          12          29        60        81
  667  NN          INTEGER                        REFS          63          68   DEFINED        31
    2  NNP         INTEGER             COMF       REFS          15          68        73        85       117     2*118       124
  723  NONP        INTEGER                        REFS         119         120       121   DEFINED       117       119       120
    6  NO1         INTEGER             COMB       REFS          12          31        61        62
    7  NO2         INTEGER             COMB       REFS          12          82
  666  NS          INTEGER                        REFS          51          53        64        74        87        88       115
                                                 3*128         129         134   DEFINED        29
  715  NU          INTEGER                        REFS          98     DEFINED        94
  716  N1          INTEGER                        REFS          96          97        98   DEFINED        95
  672  PIF         REAL                           REFS        2*35     DEFINED        34
    0  QI          REAL          ARRAY     F.P.   REFS           4         105       111       134   DEFINED         1        90
                                                   105         111
    0  QR          REAL          ARRAY     F.P.   REFS           4         103       108       110       134
                                               DEFINED           1          89       103       108       110
   36  RBBO        REAL          ARRAY     COMD   REFS          13
  500  SBBO        REAL          ARRAY     COMD   REFS          13
  673  TINT        REAL                           REFS          38          39   DEFINED        35
    0  X           REAL          ARRAY     COMD   REFS          13
   74  XI          REAL          ARRAY     COMD   REFS          13
   50  XII         REAL          ARRAY     COMD   REFS          13          98       100       102
  334  XIMW        REAL          ARRAY     COMD   REFS          13
   24  XMW         REAL          ARRAY     COMD   REFS          13
   12  Y           REAL          ARRAY     COMD   REFS          13        2*98
    2  YOE         REAL                    COMI   REFS          16
    3  YOEX        REAL                    COMI   REFS          16
  710  ZHR         REAL                           REFS          66     DEFINED        65
    0  ZK          REAL                    COMI   REFS          16          36        37        41        44        77       104
                                                   107         116         126       133   DEFINED        30
  700  ZKB         REAL                           REFS          65     DEFINED        44
    1  ZKX         REAL                    COMI   REFS          16
    0  ZM          REAL                    COMJ   REFS          17         116       126       133
    3  Z2A         REAL                    COMF   REFS          15
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       CLSQ                    8             68
       RNRW                    3             61        62        82

INLINE FUNCTIONS     TYPE    ARGS      DEF LINE  REFERENCES
       AIMAG       REAL        1  INTRIN              76
       CMPLX       COMPLEX     2  INTRIN              66
       REAL        REAL        1  INTRIN              75

STATEMENT LABELS              DEF LINE   REFERENCES
  144  1                          73         70
    0  2                          62         60
    0  3                          82         81
  303  5                         112         87        88       109
  263  6                         106         91        95     2*104
    0  7            INACTIVE     100       2*99
  245  8                         102         99
  251  9                         103        101
```

```
STATEMENT LABELS                  DEF LINE   REFERENCES
    0  10             INACTIVE     105         104
    0  12             INACTIVE     108        2*107
  276  13                          110         107
  541  38        FMT               143         123
  543  39        FMT               144         124
  563  40        FMT               147         126        133
  372  41                          134         129        131
  603  42        FMT               151         134
    0  72                           66          63         64
   71  73                           58          54
   75  75                           60          57
    0  80                          125         115
  623  81        FMT               154         116
  413  82                          135         113
    0  109                          78          73         74
   41  200                          39          36
   51  201                          44          41
  415  500                         137          69
  642  501       FMT               157         137
  420  550                         159         136

LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
   76  2         J          60 62       15B                  EXT REFS
  114  72        I          63 66       17B                  NOT INNER
  123  72        J          64 66        5B        INSTACK
  145  109       I          73 78       22B                  NOT INNER
  156  109       J          74 78        5B        INSTACK
  170  3         J          81 82       10B                  EXT REFS
  205  5         I          87 112     103B                  EXT REFS  NOT INNER
  206  5         J          88 112     100B                  EXT REFS  NOT INNER
  213  6         L1         91 106      55B                  EXT REFS  NOT INNER
  223  6         N1         95 106      43B                  EXT REFS
  313  80        J         115 125      41B                  EXT REFS  NOT INNER
  336            I         124 124      12B                  EXT REFS
  364  41        I         129 134      27B                  EXT REFS  NOT INNER
  375            J         134 134      12B                  EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMA        41                 0 LC     (40)            40 BR     (1)
       COMB        12                 0 ISI    (1)              1 M      (1)             2 IRR    (1)
                                      3 N      (1)              4 ISS    (1)             5 LIRA   (1)
                                      6 NO1    (1)              7 NO2    (1)             8 NMOD   (1)
                                      9 ABO    (1)             10 ALO    (1)            11 M2     (1)
       COMD       420                 0 X      (10)            10 Y      (10)           20 XMW    (10)
                                     30 RBBO   (10)            40 XII    (20)           60 XI     (60)
                                    120 ETA    (100)          220 XIMW   (100)         320 SBBO   (100)
       COMF         4                 0 MCC    (1)              1 NLRR   (1)             2 NNP    (1)
                                      3 Z2A    (1)
       COMI         4                 0 ZK     (1)              1 ZKX    (1)             2 YOE    (1)
                                      3 YOEX   (1)
       COMJ         1                 0 ZM     (1)
       CTAPES      50                 0 ITAPES (50)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       ALPHA     4000                 0 HR     (4000)        2000 CHR    (2000)
```

```
STATISTICS
  PROGRAM LENGTH              32311B   13513
  CM LABELED COMMON LENGTH     1024B     532
          52000B CM USED
```

```
      SUBROUTINE CLSQ       74/74    OPT=1                        FTN 4.8+577        85/01/23. 08.10.44        PAGE     1


                 SUBROUTINE CLSQ( A, L, M, Y, N, BETA, MID, NIX)                   CLSQ        2
                 DIMENSION  A(2,1), Y(2,1), BETA(1)                                CLSQ        3
                 NO = IABS(N)                                                      CLSQ        4
                 IF (N)  120, 100, 100                                             CLSQ        5
             100 CALL UNIFAC( A, L, M, BETA, MID, NIX)                             CLSQ        6
                 IF (NIX)  130, 110, 110                                           CLSQ        7
             110 IF (N)  120, 130, 120                                             CLSQ        8
             120 CALL UNISLV(A, L, M, Y, NO, BETA, MID)                            CLSQ        9
             130 RETURN                                                            CLSQ       10
                 END                                                               CLSQ       11


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  CLSQ          1          9

VARIABLES      SN  TYPE            RELOCATION
    0  A           REAL        ARRAY    F.P.        REFS        2        5        8   DEFINED        1
    0  BETA        REAL        ARRAY    F.P.        REFS        2        5        8   DEFINED        1
    0  L           INTEGER              F.P.        REFS        5        8   DEFINED        1
    0  M           INTEGER              F.P.        REFS        5        8   DEFINED        1
    0  MID         INTEGER              F.P.        REFS        5        8   DEFINED        1
    0  N           INTEGER              F.P.        REFS        3        4        7   DEFINED        1
    0  NIX         INTEGER              F.P.        REFS        5        6   DEFINED        1
   60  NO          INTEGER                          REFS        8   DEFINED        3
    0  Y           REAL        ARRAY    F.P.        REFS        2        8   DEFINED        1

EXTERNALS          TYPE   ARGS       REFERENCES
       UNIFAC               6             5
       UNISLV               7             8

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       IABS      INTEGER    1  INTRIN                3

STATEMENT LABELS             DEF LINE   REFERENCES
    0  100         INACTIVE      5        2*4
    0  110         INACTIVE      7        2*6
   26  120                       8         4        2*7
   40  130                       9         6         7

STATISTICS
  PROGRAM LENGTH                61B        49
          52000B CM USED
```

```
      SUBROUTINE UNIFAC(A, L, M, BETA, MID, NIX)                        UNIFAC   2
C                                                                       UNIFAC   3
C    UNITARY - TRIANGULAR FACTORIZATION OF AN L BY M COMPLEX MATRIX     UNIFAC   4
C    (WITH L GE M.)                                                     UNIFAC   5
C                                                                       UNIFAC   6
C    UNITARY FACTORS ARE HOUSEHOLDER ELEMENTARY HERMITIAN MATRICES OF   UNIFAC   7
C    THE FORM                                                           UNIFAC   8
C                 I  -  BETA * V * VC,                                  UNIFAC   9
C    WHERE VC DESIGNATES V CONJUGATE TRANSPOSE, AND V HAS AN IMPLICIT 1. UNIFAC  10
C    IN THE PIVOT POSITION.  ELEMENTS OF V ARE STORED OVER CORRESPONDING UNIFAC  11
C    ELEMENTS OF A AND THE BETA VALUES ARE SAVED IN THE BETA ARRAY.     UNIFAC  12
C                                                                       UNIFAC  13
C                                                                       UNIFAC  14
C                                                                       UNIFAC  15
C    PARAMETER SIGNIFICANCE                                             UNIFAC  16
C                                                                       UNIFAC  17
C      A      -  DOUBLE ARRAY CONTAINING MATRIX TO BE FACTORED,         UNIFAC  18
C                                                                       UNIFAC  19
C      L, M   -  NUMBER OF ROWS AND COLUMNS OF A,                       UNIFAC  20
C                                                                       UNIFAC  21
C      BETA   -  ARRAY OF BETA VALUES,                                  UNIFAC  22
C                                                                       UNIFAC  23
C      MID    -  ROW (FIRST) DIMENSION OF THE ARRAY A,                  UNIFAC  24
C                                                                       UNIFAC  25
C      NIX    -  ERROR INDICATOR SET TO 0 AFTER A SUCCESSFUL EXECUTION  UNIFAC  26
C                AND TO -K IF THE K COLUMNS OF A ARE (APPROXIMATELY)    UNIFAC  27
C                LINEARLY DEPENDENT.                                    UNIFAC  28
C                                                                       UNIFAC  29
C                                                                       UNIFAC  30
      COMPLEX  CRHO, DUPER                                              UNIFAC  31
      DIMENSION  A(2,1), BETA(1), RHO(2), ALF(2)                        UNIFAC  32
      EQUIVALENCE  (CRHO, RHO(1))                                       UNIFAC  33
      KB = 1                                                            UNIFAC  34
      LK = L                                                            UNIFAC  35
      LP1MK = L                                                         UNIFAC  36
C  I.E.  L + 1 - K                                                      UNIFAC  37
      LAST = M * MID                                                    UNIFAC  38
      DO 170  K = 1, M                                                  UNIFAC  39
      K1K = KB + K                                                      UNIFAC  40
      KK = K1K - 1                                                      UNIFAC  41
      TEMP = -SQRT(SUPERF( A(1,KB), A(1,KB), 2*K-1, 2*L, 1) )           UNIFAC  42
      RHO(1) = TEMP                                                     UNIFAC  43
      RHO(2) = 0.                                                       UNIFAC  44
      IF (TEMP)  90, 190, 90                                            UNIFAC  45
   90 SIZE = SQRT( A(1,KK)**2 + A(2,KK)**2 )                            UNIFAC  46
      IF (SIZE)  100, 110, 100                                          UNIFAC  47
  100 RHO(1) = TEMP * (A(1,KK) / SIZE)                                  UNIFAC  48
      RHO(2) = TEMP * (A(2,KK) / SIZE)                                  UNIFAC  49
  110 BETA(K) = (SIZE - TEMP) / TEMP                                    UNIFAC  50
      ALF(1) = A(1,KK) - RHO(1)                                         UNIFAC  51
      ALF(2) = A(2,KK) - RHO(2)                                         UNIFAC  52
      SIZE = ALF(1)**2 + ALF(2)**2                                      UNIFAC  53
      ALF(1) = ALF(1) / SIZE                                            UNIFAC  54
      ALF(2) = ALF(2) / SIZE                                            UNIFAC  55
      DO 120  JK = KK,LK                                                UNIFAC  56
      TEMP = A(1,JK)*ALF(1) + A(2,JK)*ALF(2)                            UNIFAC  57
      A(2,JK) = A(2,JK)*ALF(1) - A(1,JK)*ALF(2)                         UNIFAC  58
```

```
        120 A(1,JK) = TEMP                                                UNIFAC     59
            A(1,KK) = RHO(1)                                              UNIFAC     60
            A(2,KK) = RHO(2)                                              UNIFAC     61
            TEMP = BETA(K)                                                UNIFAC     62
            KJ = KK                                                       UNIFAC     63
        130 KJ = KJ + MID                                                 UNIFAC     64
            IF (KJ - LAST)  140, 140, 160                                 UNIFAC     65
        140 CRHO = DUPER( A(1,KK), A(1,KJ), 2, LP1MK, -1)                 UNIFAC     66
            ALF(1) = TEMP * (RHO(1) + A(1,KJ))                            UNIFAC     67
            ALF(2) = TEMP * (RHO(2) + A(2,KJ))                            UNIFAC     68
            A(1,KJ) = A(1,KJ) + ALF(1)                                    UNIFAC     69
            A(2,KJ) = A(2,KJ) + ALF(2)                                    UNIFAC     70
            IJ = KJ                                                       UNIFAC     71
            DO 150  IK = K1K, LK                                          UNIFAC     72
            IJ = IJ + 1                                                   UNIFAC     73
            A(1,IJ) = A(1,IJ) + ALF(1)*A(1,IK) - ALF(2)*A(2,IK)           UNIFAC     74
        150 A(2,IJ) = A(2,IJ) + ALF(1)*A(2,IK) + ALF(2)*A(1,IK)           UNIFAC     75
            GO TO 130                                                     UNIFAC     76
        160 LP1MK = LP1MK - 1                                             UNIFAC     77
            LK = LK + MID                                                 UNIFAC     78
        170 KB = KB + MID                                                 UNIFAC     79
            NIX = 0                                                       UNIFAC     80
        180 RETURN                                                        UNIFAC     81
        190 NIX = -K                                                      UNIFAC     82
            GO TO 180                                                     UNIFAC     83
            END                                                           UNIFAC     84
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 UNIFAC	1	80

VARIABLES	SN	TYPE	RELOCATION									
0 A		REAL	ARRAY	F.P.	REFS	31	2*41	2*45	47	48	50	51
					2*56	2*57	2*65	66	67	68	69	3*73
					3*74	DEFINED	1	57	58	59	60	68
					69	73	74					
213 ALF		REAL	ARRAY		REFS	31	2*52	53	54	2*56	2*57	68
					69	2*73	2*74	DEFINED	50	51	53	54
					66	67						
0 BETA		REAL	ARRAY	F.P.	REFS	31	61	DEFINED	1	49		
211 CRHO		COMPLEX			REFS	30	32	DEFINED	65			
207 IJ		INTEGER			REFS	72	2*73	2*74	DEFINED	70	72	
210 IK		INTEGER			REFS	2*73	2*74	DEFINED	71			
205 JK		INTEGER			REFS	2*56	3*57	58	DEFINED	55		
200 K		INTEGER			REFS	39	41	49	61	81		
					DEFINED	38						
174 KB		INTEGER			REFS	39	2*41	78	DEFINED	33	78	
206 KJ		INTEGER			REFS	63	64	65	66	67	2*68	2*69
					70	DEFINED	62	63				
202 KK		INTEGER			REFS	2*45	47	48	50	51	55	59
					60	62	65	DEFINED	40			
201 K1K		INTEGER			REFS	40	71	DEFINED	39			

```
VARIABLES      SN  TYPE              RELOCATION
    0  L           INTEGER                F.P.        REFS        34         35        41   DEFINED         1
  177  LAST        INTEGER                            REFS        64    DEFINED        37
  175  LK          INTEGER                            REFS        55         71        77   DEFINED        34        77
  176  LP1MK       INTEGER                            REFS        65         76   DEFINED        35        76
    0  M           INTEGER                F.P.        REFS        37         38   DEFINED         1
    0  MID         INTEGER                F.P.        REFS        37         63        77        78   DEFINED         1
    0  NIX         INTEGER                F.P.     DEFINED         1         79        81
  211  RHO         REAL          ARRAY                REFS        31         32        50        51        59        60        66
                                                        67   DEFINED         42        43        47        48
  204  SIZE        REAL                               REFS        46         47        48        49        53        54
                                                   DEFINED        45         52
  203  TEMP        REAL                               REFS        42         44        47        48      2*49        58        66
                                                        67   DEFINED         41        56        61

EXTERNALS           TYPE     ARGS          REFERENCES
       DUPER       COMPLEX    5                30          65
       SQRT        REAL       1 LIBRARY        41          45
       SUPERF      REAL       5                41

STATEMENT LABELS                DEF LINE   REFERENCES
    0  90           INACTIVE       45        2*44
    0  100          INACTIVE       47        2*46
   43  110                         49          46
    0  120                         58          55
   76  130                         63          75
    0  140          INACTIVE       65        2*64
    0  150                         74          71
  140  160                         76          64
    0  170                         78          38
  151  180                         80          82
  152  190                         81          44

LOOPS  LABEL      INDEX      FROM-TO     LENGTH     PROPERTIES
   14  170        K           38 78       134B                  EXT REFS     EXITS    NOT INNER
   61  120        JK          55 58        6B        INSTACK
  126  150        IK          71 74        11B         OPT

EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CRHO           2                  0 RHO     (2)

STATISTICS
  PROGRAM LENGTH                 237B       159
          52000B CM USED
```

```
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS      DUPER     2
            COMPLEX FUNCTION DUPER (X,Y,LEAST,LAST,MID)                        DUPER     3
            COMPLEX DCMPLF                                                     DUPER     4
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS         DUPER     5
      C                                                                        DUPER     6
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      DUPER     7
      C     COMPLEX FUNCTION DUPER*16 (X,Y,LEAST,LAST,MID)                     DUPER     8
      C     DOUBLE PRECISION S                                                 DUPER     9
      C     COMPLEX*16 DCMPLF                                                  DUPER    10
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         DUPER    11
      C                                                                        DUPER    12
      C   INNER PRODUCT OF 2 COMPLEX VECTORS FROM LEAST TO LAST.  CONJUGATE    DUPER    13
      C                                                                        DUPER    14
      C                                                                        DUPER    15
            DIMENSION  S(2), X(2,1), Y(2,1)                                    DUPER    16
            S(1)  =  0.0                                                       DUPER    17
            S(2)  =  0.0                                                       DUPER    18
            IF (LEAST - LAST)  100, 100, 150                                   DUPER    19
        100 MIDX = IABS(MID)                                                   DUPER    20
            IX = (LEAST - 1) * MIDX  +  1                                      DUPER    21
            IF (MID)  110, 150, 130                                            DUPER    22
      C                                                                        DUPER    23
      C   WHEN MID IS LT 0,  X CONJUGATE IS USED.                              DUPER    24
      C                                                                        DUPER    25
        110 DO 120  IY = LEAST, LAST                                           DUPER    26
            S(1) = S(1) + X(1,IX)*Y(1,IY) + X(2,IX)*Y(2,IY)                    DUPER    27
            S(2) = S(2) + X(1,IX)*Y(2,IY) - X(2,IX)*Y(1,IY)                    DUPER    28
        120 IX = IX + MIDX                                                     DUPER    29
            GO TO 150                                                          DUPER    30
      C                                                                        DUPER    31
      C   WHEN MID IS GT 0,  X ITSELF IS USED.                                 DUPER    32
      C                                                                        DUPER    33
        130 DO 140  IY = LEAST, LAST                                           DUPER    34
            S(1) = S(1) + X(1,IX)*Y(1,IY) - X(2,IX)*Y(2,IY)                    DUPER    35
            S(2) = S(2) + X(1,IX)*Y(2,IY) + X(2,IX)*Y(1,IY)                    DUPER    36
        140 IX = IX + MIDX                                                     DUPER    37
        150 DUPER   = DCMPLF(S(1), S(2))                                       DUPER    38
            RETURN                                                             DUPER    39
            END                                                                DUPER    40
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
5 DUPER	2	38

VARIABLES	SN	TYPE	RELOCATION								
74 DUPER		COMPLEX		DEFINED	37						
77 IX		INTEGER		REFS	2*26	2*27	28	2*34	2*35	36	
				DEFINED	20	28	36				
100 IY		INTEGER		REFS	2*26	2*27	2*34	2*35	DEFINED	25	33
0 LAST		INTEGER	F.P.	REFS	18	25	33	DEFINED	2		
0 LEAST		INTEGER	F.P.	REFS	18	20	25	33	DEFINED	2	
0 MID		INTEGER	F.P.	REFS	19	21	DEFINED	2			

```
VARIABLES      SN  TYPE           RELOCATION
   76  MIDX        INTEGER                            REFS       20       28       36   DEFINED      19
  101  S           REAL       ARRAY                   REFS       15       26       27       34       35     2*37
                                                   DEFINED       16       17       26       27       34       35
    0  X           REAL       ARRAY    F.P.           REFS       15     2*26     2*27     2*34     2*35
                                                   DEFINED        2
    0  Y           REAL       ARRAY    F.P            REFS       15     2*26     2*27     2*34     2*35
                                                   DEFINED        2

EXTERNALS            TYPE    ARGS       REFERENCES
       DCMPLF      COMPLEX    2              3        37

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE  REFERENCES
       IABS        INTEGER    1  INTRIN                 19

STATEMENT LABELS                DEF LINE   REFERENCES
    0  100          INACTIVE      19         2*18
    0  110          INACTIVE      25          21
    0  120                        28          25
   42  130                        33          21
    0  140                        36          33
   65  150                        37          18        21        29

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   30  120       IY          25 28        11B         OPT
   53  140       IY          33 36        11B         OPT

STATISTICS
  PROGRAM LENGTH                  103B      67
          52000B CM USED
```

```
  1              FUNCTION SUPERF(X, Y, LEAST, LAST, MIDX)                      SUPERF      2
           C                                                                   SUPERF      3
           C    INNER PRODUCT OF 2 REAL VECTORS FROM LEAST TO LAST.            SUPERF      4
           C                                                                   SUPERF      5
  5        C                                                                   SUPERF      6
           CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS SUPERF      7
           C     DOUBLE PRECISION SUPERF, S                                    SUPERF      8
           CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    SUPERF      9
           C                                                                   SUPERF     10
 10              DIMENSION  X(1), Y(1)                                         SUPERF     11
                 S = 0.0                                                       SUPERF     12
                 IF (LEAST - LAST)  100, 100, 120                              SUPERF     13
             100 IX = (LEAST - 1) * MIDX  +  1                                 SUPERF     14
                 DO 110  IY = LEAST, LAST                                      SUPERF     15
 15              S = S  +  X(IX) * Y(IY)                                       SUPERF     16
             110 IX = IX + MIDX                                                SUPERF     17
             120 SUPERF = S                                                    SUPERF     18
                 RETURN                                                        SUPERF     19
                 END                                                           SUPERF     20


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    4  SUPERF        1           18

VARIABLES      SN  TYPE           RELOCATION
   33  IX          INTEGER                        REFS       15        16   DEFINED      13        16
   34  IY          INTEGER                        REFS       15   DEFINED        14
    0  LAST        INTEGER              F.P.      REFS       12        14   DEFINED       1
    0  LEAST       INTEGER              F.P.      REFS       12        13        14   DEFINED       1
    0  MIDX        INTEGER              F.P.      REFS       13        16   DEFINED       1
   32  S           REAL                           REFS       15        17   DEFINED      11        15
   31  SUPERF      REAL                        DEFINED       17
    0  X           REAL        ARRAY    F.P.      REFS       10        15   DEFINED       1
    0  Y           REAL        ARRAY    F.P.      REFS       10        15   DEFINED       1

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100         INACTIVE      13         2*12
    0  110                       16          14
   27  120                       17          12

LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
   22  110       IY         14 16        4B        INSTACK

STATISTICS
  PROGRAM LENGTH                 35B        29
         52000B CM USED
```

```
      SUBROUTINE UNISLV(A, L, M, Y, N, BETA, MID)
C
C
      COMPLEX  CALF, DUPER
      DIMENSION  A(2 1), Y(2,1), BETA(1), ALF(2)
      EQUIVALENCE  ( CALF, ALF(1) )
      MID1 = MID + 1
      LEAP = M - 1
      KBY = 1
C
C   MAJOR LOOP PROCESSES 1 RIGHT SIDE FOR EACH K VALUE.
C
      DO 140  K = 1, N
      IB = 1
      LI = L
      IKY = KBY
C
C    I LOOP MULTIPLIES RIGHT SIDE BY THE HOUSEHOLDER MATRICES.
C
      DO 110  I = 1, M
      I1I = IB + I
      CALF = DUPER( A(1,IB), Y(1,KBY), I+1, L, -1)
      ALF(1) = BETA(I) * (Y(1,IKY) + ALF(1))
      ALF(2) = BETA(I) * (Y(2,IKY) + ALF(2))
      Y(1,IKY) = Y(1,IKY) + ALF(1)
      Y(2,IKY) = Y(2,IKY) + ALF(2)
      JKY = IKY
      DO 100  JI = I1I, LI
      JKY = JKY + 1
      Y(1,JKY) = Y(1,JKY)  +  ALF(1) * A(1,JI)  -  ALF(2) * A(2,JI)
  100 Y(2,JKY) = Y(2,JKY)  +  ALF(1) * A(2,JI)  +  ALF(2) * A(1,JI)
      IKY = IKY + 1
      IB = IB + MID
  110 LI = LI + MID
      IKY = KBY + LEAP
      II = I1I - 1
      ALF(2) = A(1,II)**2 + A(2,II)**2
      ALF(1)   = (Y(1,IKY)*A(1,II) + Y(2,IKY)*A(2,II)) / ALF(2)
      Y(2,IKY) = (Y(2,IKY)*A(1,II) - Y(1,IKY)*A(2,II)) / ALF(2)
      Y(1,IKY) = ALF(1)
      IF (LEAP) 140, 140, 120
C
C   KOUNT LOOP CARRIES OUT A BACK SOLUTION TO COMPLETE LEAST-SQUARES
C   PROBLEM.
C
  120 DO 130  KOUNT = 2, M
      IKY = IKY - 1
      II = II - MID1
      CALF = DUPER( A(1,II), Y(1,IKY), 2, KOUNT, MID)
      ALF(1) = Y(1,IKY) - ALF(1)
      ALF(2) = Y(2,IKY) - ALF(2)
      TEMP = A(1,II)**2 + A(2,II)**2
      Y(1,IKY) = ( ALF(1)*A(1,II) + ALF(2)*A(2,II) ) / TEMP
  130 Y(2,IKY) = ( ALF(2)*A(1,II) - ALF(1)*A(2,II) ) / TEMP
  140 KBY = KBY + MID
      RETURN
      END
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  722  414                      275        271
    0  415        INACTIVE      282        281
 1026  416                      291        2*281
 2004  418    FMT               351        296
 2020  421    FMT               354        208
 2026  422    FMT               355        291
  517  600                      197        155       193       2*195
    0  601        INACTIVE      156        2*155
    0  602        INACTIVE      224        2*223
 2037  609    FMT               357        212
 2045  611    FMT               358        217
 2053  612    FMT               359        297
 2061  613    FMT               360        302
 2067  614    FMT               361        306
 2075  615    FMT               362        311
 2103  616    FMT               363        315
 2111  617    FMT               364        320
    0  630        INACTIVE      217        2*216
    0  632        INACTIVE      302        2*301
 1072  633                      306        301
    0  634        INACTIVE      311        2*310
 1107  635                      315        310
    0  636        INACTIVE      320        2*319
 2117  650    FMT               365        213       218       277       298       303       307       312       316       321
    0  651                       76         70
  350  670                      150        2*145
    0  671        INACTIVE      146        145
 1050  700                      294        290
 1124  701                      324         77       223       319
 1053  702                      296        293
 1055  703                      297        295
  616  900                      221        211       216

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   53  651      IP          70  76      13B        OPT
   70  701      KL          77 324    1037B               EXT REFS  NOT INNER
   73  200      K           80 210     506B               EXT REFS  NOT INNER
  110  150      N           90 114     105B               EXT REFS  NOT INNER
  133  150      J           97 114      60B               EXT REFS
  217  250      I          116 143     113B               EXT REFS  NOT INNER
  232  250      N          123 143      75B               EXT REFS  NOT INNER
  257  250      J          130 143      46B               EXT REFS
  333  201      I          144 154      27B               EXT REFS
  367  251      N          160 179      61B               EXT REFS  NOT INNER
  370  251      J          161 179      56B               EXT REFS
  541           I          205 205      15B               EXT REFS
  565           I          209 209      10B               EXT REFS
  646  12       I          242 267      36B        OPT
  731  305      K          278 280       5B      INSTACK
  745           K          283 283      15B               EXT REFS
  770           K          286 286      15B               EXT REFS
 1013           K          289 289      11B               EXT REFS
 1033           K          292 292      13B               EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      COMA         41               0 LC     (40)             40 BR     (1)
      COMB         12               0 ISI    (1)               1 M      (1)             2 IRR     (1)
```

STATEMENT LABELS				DEF LINE	REFERENCES			
0	1		INACTIVE	100	2*99			
153	2			103	99			
150	3			101	100			
162	4			106	4*100	2*103		
163	5			107	102	105		
0	6		INACTIVE	104	103			
0	7		INACTIVE	133	2*132			
277	8			136	132			
274	9			134	133			
306	10			139	4*133	2*136		
307	11			140	135	138		
703	12			267	242	254		
0	13		INACTIVE	164	2*163			
411	14			168	163	4*164		
405	15			165	164			
424	16			172	2*168			
426	17			174	167	171		
0	18		INACTIVE	169	168			
0	32		INACTIVE	137	136			
210	150			114	90	97	2*112	
0	160		INACTIVE	92	2*91			
116	161			94	91			
126	162			96	93			
0	170		INACTIVE	125	2*124			
241	171			127	124			
252	172			129	126			
576	200			210	80	197	207	
357	201			154	144	152		
322	250			143	116	123	130	2*141
443	251			179	160	161	2*176	
1627	300	FMT		329	198			
1646	301	FMT		332	202			
1653	303	FMT		333	204			
1667	304	FMT		335	205	283	286	
0	305			280	278			
1672	306	FMT		336	276			
1704	307	FMT		338	282			
1720	308	FMT		340	285			
1734	309	FMT		342	288			
1743	310	FMT		343	294			
1773	390	FMT		348	289			
1776	391	FMT		349	209			
2001	392	FMT		350	292			
175	400			111	2*109			
0	401		INACTIVE	110	109			
0	402		INACTIVE	113	112			
0	403		INACTIVE	142	141			
362	404			155	115			
0	406		INACTIVE	177	176			
504	407			191	2*182			
0	408		INACTIVE	183	182			
0	409		INACTIVE	198	2*197			
0	410		INACTIVE	196	195			
0	411		INACTIVE	204	203			
560	412			208	2*203			
641	413			242	233			

```
VARIABLES     SN  TYPE           RELOCATION
   0  NPRES      INTEGER              COMC        REFS         26        115        197        211
2165  NPTS       INTEGER                          REFS         75        214        219    DEFINED         68         75
2157  NS         INTEGER                          REFS         77    DEFINED         62
6407  NSYM       INTEGER     ARRAY                REFS         17         75        214        219    DEFINED         71         73
   3  NZ         INTEGER              COMB        REFS         25
2210  NZL        INTEGER                          REFS        201    DEFINED        200
2657  PHAD       REAL        ARRAY                REFS         11        283    DEFINED        187
2633  PHAR       REAL        ARRAY                REFS         11        187        283    DEFINED        186
2753  PHDP       REAL        ARRAY                REFS         12        205    DEFINED        149
3047  PHMD       REAL        ARRAY                REFS         13        286    DEFINED        190
3023  PHMR       REAL        ARRAY                REFS         13        190        286    DEFINED        189
2727  PHRP       REAL        ARRAY                REFS         12        149        205    DEFINED        148
6527  PREAL      REAL        ARRAY                REFS         19        214    DEFINED         31
2703  PRES       REAL        ARRAY                REFS         12        205    DEFINED        147
2537  PRESI      REAL        ARRAY                REFS         10        113        142      2*147        148        153        205
                                               DEFINED         89        113        122        142
2513  PRESR      REAL        ARRAY                REFS         10        111        140      2*147        148        151        205
                                                   209    DEFINED         88        111        121        140
6543  PRIMA      REAL        ARRAY                REFS         19        219    DEFINED         32
2154  RTD        REAL                             REFS        149        187        190    DEFINED         48
2201  SLFT       REAL                             REFS        101        104        134        137        165        166        169
                                                   170    DEFINED         96        129
2162  STEPX      REAL                             REFS         83        117    DEFINED         65
2164  STEPY      REAL                             REFS         78         81        280    DEFINED         67
2211  SURF       REAL                             REFS        243        268        272    DEFINED        224        243
6313  XCLI       REAL        ARRAY                REFS         16        304    DEFINED        236        264
6267  XCLR       REAL        ARRAY                REFS         16        299    DEFINED        230        251
6363  XCMI       REAL        ARRAY                REFS         17        313    DEFINED        237        265
6337  XCMR       REAL        ARRAY                REFS         17        308    DEFINED        231        252
6457  XCPI       REAL        ARRAY                REFS         18        322    DEFINED        238        266
6433  XCPR       REAL        ARRAY                REFS         18        317    DEFINED        232        253
2227  XI         REAL        ARRAY                REFS          6         84       2*92       2*94         95        117        118
                                                 2*125      2*127        128    DEFINED         83        117
6557  XINA       REAL        ARRAY                REFS         19        214        219    DEFINED         33
2607  XJ         REAL        ARRAY                REFS         11         85        120        205        209
                                               DEFINED         84        118
2224  XLTI       REAL                             REFS        294    DEFINED        273
2221  XLTR       REAL                             REFS        294        296    DEFINED        269
   5  XM         REAL        ARRAY    COMC        REFS         26        245        256
2225  YLTI       REAL                             REFS        294    DEFINED        274
2222  YLTR       REAL                             REFS        294        296    DEFINED        270
   2  YOE        REAL                 COMI        REFS         28
   3  YOEX       REAL                 COMI        REFS         28
   0  ZK         REAL                 COMI        REFS         28        109        112        141        145        152        176
                                                   182        195        198        203        213        216        218        233
                                                   254        271        277        281        298        301        303        307
                                                   310        312        316        319        321    DEFINED         61
   1  ZKX        REAL                 COMI        REFS         28
   0  ZM         REAL                 COMJ        REFS         29        198        213        218        277        298        303
                                                   307        312        316        321
   3  Z3A        REAL                 COMF        REFS         27
      VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS       REFERENCES
      FATAN      REAL        2            148        186        189
      PICTUR                14            214        219        299        304        308        313        317        322
      SQRT       REAL        1 LIBRARY     92         94         96        125        127        129        147        185        188
```

```
VARIABLES    SN  TYPE            RELOCATION
                                                2*266   DEFINED    116     144     205     209     242
 5423  IAUX      INTEGER    ARRAY               REFS       15      214     219     299     304     308     313
                                                 317      322
    2  III       INTEGER           COMC         REFS       26       64      73      82     116     119     144
                                                 150      199      200     205     209
    0  IND       INTEGER            F.P.        REFS       63   DEFINED      4
 2167  IP        INTEGER                        REFS       71       72    2*73    2*74      75      76
                                             DEFINED       70
 2174  IPR       INTEGER                        REFS       85      120     151     153  DEFINED      82     119
                                                 150
    2  IRR       INTEGER           COMB         REFS       25
    4  IS        INTEGER           COMB         REFS       25
    0  ISI       INTEGER           COMB         REFS       25      198     213     218     277     298     303
                                                 307      312      316     321
    0  ITAPES    INTEGER    ARRAY  CTAPES       REFS       23       30      45
 2153  ITAPEW    INTEGER                     DEFINED       45  I/O REFS    198     202     204     205     208
                                                 209      212      213     217     218     276     277     282
                                                 283      285      286     288     289     291     292     294
                                                 296      297      298     302     303     306     307     311
                                                 312      315      316     320     321
 2202  J         INTEGER                        REFS       98      100     108     110     111     113     131
                                                 133      140      142     162     164     174     175     177
                                                 178  DEFINED       97     130     161
 2173  K         INTEGER                        REFS       82       86     103     111     113     119     136
                                                 140      142      150     156     157     158     159     168
                                               2*174    2*175    2*177   2*178   2*180   2*181   2*183   2*184
                                               5*185    3*186    2*187   5*188   3*189   2*190     191     192
                                                 193    3*194    3*196     279     280   6*283   6*286   3*289
                                               4*292  DEFINED       80     278     283     286     289     292
    3  KK        INTEGER           COMC         REFS       26       66      73      74      80     242     278
                                                 283      286      289     292
 2170  KL        INTEGER                        REFS      108      110     198     212     217     276     297
                                                 302      306      311     315     320  DEFINED      77
 2175  L         INTEGER                        REFS      107      108     110  DEFINED      87     107
    0  LC        INTEGER    ARRAY  COMA         REFS       24     2*61
 2172  LINE      INTEGER                        REFS      198      199     201  DEFINED      79     199     201
    5  LIRR      INTEGER           COMB         REFS       25
 2160  LL        INTEGER                        REFS       98      131     162     193  DEFINED      63
    1  M         INTEGER           COMB         REFS       25
    0  MCC       INTEGER           COMF         REFS       27       90     123     160
 2203  MJ        INTEGER                        REFS       99      104     132     137     163     169     170
                                             DEFINED       98      131     162
 2166  MPTS      INTEGER                        REFS       76      299     304     308     313     317     322
                                             DEFINED       69       76
 6503  MSYM      INTEGER    ARRAY               REFS       18       76     299     304     308     313     317
                                                 322  DEFINED       72      74
   13  M2        INTEGER           COMB         REFS       25
 2176  N         INTEGER                        REFS       91       95     108     110     111     113     124
                                                 128      140      142     165     166     169     170     174
                                                 175      177      178 DEFINED      90     123     160
    1  NCL       INTEGER           COMC         REFS       26      155     223
    1  NLRR      INTEGER           COMF         REFS       27       97     130     161
   10  NMOD      INTEGER           COMB         REFS       25       62
    2  NNP       INTEGER           COMF         REFS       27
    6  NO1       INTEGER           COMB         REFS       25
    7  NO2       INTEGER           COMB         REFS       25
    4  NPRD      INTEGER           COMC         REFS       26
```

```
VARIABLES      SN  TYPE            RELOCATION
 3143   AXI        REAL      ARRAY              REFS       14      214      219  DEFINED       85      120
 2506   B          REAL      ARRAY              REFS        9      166      170  DEFINED       56       57       58
                                                  59       60
   31   BBO        REAL      ARRAY    COMC      REFS       26      111      113      140      142      243      245
                                                 247      248      256      258      259      260      261
   55   BBT        REAL               COMC      REFS       26      224
   50   BR         REAL               COMA      REFS       24
 2215   CALI       REAL                         REFS      255      272      273      274  DEFINED      239      255
 2212   CALR       REAL                         REFS      244      268      269      270  DEFINED      225      244
 2200   CK         REAL                         REFS       95      128  DEFINED       94      127
 3117   CL         REAL      ARRAY              REFS       14      260      283  DEFINED      185      260
 2177   CLFT       REAL                         REFS      101      104      134      137  DEFINED       92       95
                                                 125      128
 2361   CLI        REAL      ARRAY              REFS        8      177      183    2*185      186      196      236
                                                 239      240      255      256      257      258      264      283
                                             DEFINED      158      177      183      258
 6623   CLIN       REAL      ARRAY              REFS       20      304  DEFINED       36
 2335   CLR        REAL      ARRAY              REFS        7      174      180    2*185      186      194      225
                                                 226      230      244      245      246      247      251      283
                                                 292  DEFINED      156      174      180      247
 6607   CLRN       REAL      ARRAY              REFS       20      299  DEFINED       35
 2223   CLTI       REAL                         REFS      294  DEFINED      272
 2220   CLTR       REAL                         REFS      294      296  DEFINED      268
 2777   CM         REAL      ARRAY              REFS       13      261      286  DEFINED      188      261
 2405   CMI        REAL      ARRAY              REFS        8      178      184    2*188      189      196      237
                                                 240      256      259      265      286  DEFINED      159      178
                                                 184      259
 6653   CMIN       REAL      ARRAY              REFS       21      313  DEFINED       38
 2217   CMIX       REAL                         REFS      257      274  DEFINED      241      257
 2216   CMIY       REAL                         REFS      256      273  DEFINED      240      256
 2563   CMR        REAL      ARRAY              REFS       10      175      181    2*188      189      194      226
                                                 231      245      248      252      286      292
                                             DEFINED      157      175      181      248
 6637   CMRN       REAL      ARRAY              REFS       21      308  DEFINED       37
 2214   CMRX       REAL                         REFS      246      270  DEFINED      227      246
 2213   CMRY       REAL                         REFS      245      269  DEFINED      226      245
 2455   CPI        REAL      ARRAY              REFS        9      234      238      262      266      289
                                             DEFINED      192      196      234      262
 6703   CPIN       REAL      ARRAY              REFS       22      322  DEFINED       40
 2431   CPR        REAL      ARRAY              REFS        8      228      232      249      253      289      292
                                             DEFINED      191      194      228      249
 6667   CPRN       REAL      ARRAY              REFS       21      317  DEFINED       39
 2204   CS         REAL                         REFS      111      113      140      142  DEFINED      101      104
                                                 106      134      137      139
 2171   ETA        REAL                         REFS       81       86     2*96      104    2*129      137      169
                                                 170      202  DEFINED       78       81
 6573   ETAN       REAL      ARRAY              REFS       20      299      304      308      313      317      322
                                             DEFINED       34
 3073   ETAS       REAL      ARRAY              REFS       14      283      286      289      292
                                             DEFINED      280
 6243   FTA        REAL      ARRAY              REFS       16      246      257      299      304      308      313
                                                 317      322  DEFINED       86
 2205   I          INTEGER                      REFS    2*117    2*118      119      120      121      122    2*125
                                               2*127      128    2*140    2*142    5*147    3*148    2*149      150
                                                 151      153    6*205    2*209      243      244    4*245    2*246
                                               3*247    3*248    2*249    2*251    2*252    2*253      255    4*256
                                               2*257    3*258    3*259    3*260    3*261    2*262    2*264    2*265
```

```
      310 FORMAT (//1H ,4X20HSURFACE COEFFICIENTS/5X11HREAL VALUES,/5X       PRESS     341
         1        5HCL = ,1PE10.3,5X23HXCP(FT FROM LE APEX) = ,1PE10.3,      PRESS     342
         2        5X10HYCP(FT) = ,1PE10.3/5X16HIMAGINARY VALUES,/5X5HCL = ,  PRESS     343
         3         1PE10.3,5X23HXCP(FT FROM LE APEX) = ,1PE10.3,5X           PRESS     344
         4         10HYCP(FT) = ,1PE10.3)                                    PRESS     345
      390 FORMAT (5X,1P3E16.8)                                               PRESS     346
      391 FORMAT (5X,1P2E16.8)                                               PRESS     347
      392 FORMAT (5X,1P4E16.8)                                               PRESS     348
      418 FORMAT (//1H ,4X20HSURFACE COEFFICIENTS,/5X5HCL = ,1PE10.3,5X      PRESS     349
         1        23HXCP(FT FROM LE APEX) = ,1PE10.3,5X10HYCP(FT) = ,        PRESS     350
         2        1PE10.3)                                                   PRESS     351
      421 FORMAT (//36H       CHORDWISE STA       REAL PART//)               PRESS     352
      422 FORMAT (//62H     SPANWISE STATION       CL                CM      PRESS     353
         1       CP//)                                                       PRESS     354
      609 FORMAT (1H1,6X6HMODE =,I5,10X20HPRESSURE-REAL VS. XI, //)          PRESS     355
      611 FORMAT (1H1,6X6HMODE =,I5,10X20HPRESSURE-IMAG VS. XI, //)          PRESS     356
      612 FORMAT (1H1,6X6HMODE =,I5,10X15HCL-REAL VS. ETA, //)               PRESS     357
      613 FORMAT (1H1,6X6HMODE =,I5,10X15HCL-IMAG VS. ETA, //)               PRESS     358
      614 FORMAT (1H1,6X6HMODE =,I5,10X15HCM-REAL VS. ETA, //)               PRESS     359
      615 FORMAT (1H1,6X6HMODE =,I5,10X15HCM-IMAG VS. ETA, //)               PRESS     360
      616 FORMAT (1H1,6X6HMODE =,I5,10X15HCP-REAL VS. ETA, //)               PRESS     361
      617 FORMAT (1H1,6X6HMODE =,I5,10X15HCP-IMAG VS. ETA, //)               PRESS     362
      650 FORMAT (5X8HSURFACE ,I3,3X9HMACH NO.=,E10.3,3X45HREDUCED FREQUENCY PRESS     363
         1 BASED ON ROOT SEMI-CHORD = ,E10.3,/)                              PRESS     364
C                                                                            PRESS     365
          RETURN                                                             PRESS     366
          END                                                                PRESS     367
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  PRESS          4          368

VARIABLES      SN  TYPE            RELOCATION
 2501  A           REAL     ARRAY                 REFS        9       165       169   DEFINED       51       52       53
                                                     54      55
   11  ABO         REAL                 COMB      REFS       25        49        50       269      273
 2253  ACO         REAL     ARRAY                 REFS        7       111       140       174      175
                                               DEFINED      108
 2304  ACOI        REAL     ARRAY                 REFS        7       113       142       177      178
                                               DEFINED      110
    0  AI          REAL     ARRAY       F.P.      REFS        6       110   DEFINED         4
 2161  AIII        REAL                           REFS       65   DEFINED        64
 2226  AK          REAL                           REFS      280   DEFINED       279
 2163  AKK         REAL                           REFS       67   DEFINED        66
 2206  AL          REAL                           REFS      174       177   DEFINED       165      169      172
 2155  ALBP        REAL                           REFS      180       181       183       184  DEFINED       49
 2156  ALBQ        REAL                           REFS      111       113       140       142  DEFINED       50
   12  ALO         REAL                 COMB      REFS       25        49        50       270      274
 2207  AM          REAL                           REFS      175       178   DEFINED       166      170      173
 4603  APRESI      REAL     ARRAY                 REFS       15       219   DEFINED       153
 3763  APRESR      REAL     ARRAY                 REFS       15       214   DEFINED       151
    0  AR          REAL     ARRAY       F.P.      REFS        6       108   DEFINED         4
```

```
      WRITE (ITAPEW,304)(ETAS(K),CMR(K),CMI(K),CM(K),PHMR(K),           PRESS     284
     1                  PHMD(K),K=1,KK)                                 PRESS     285
      WRITE (ITAPEW,309)                                                PRESS     286
      WRITE (ITAPEW,390)(ETAS(K),CPR(K),CPI(K),K=1,KK)                  PRESS     287
      GO TO 700                                                         PRESS     288
  416 WRITE (ITAPEW,422)                                                PRESS     289
      WRITE (ITAPEW,392)(ETAS(K),CLR(K),CMR(K),CPR(K),K=1,KK)           PRESS     290
      GO TO 702                                                         PRESS     291
  700 WRITE (ITAPEW,310)CLTR,XLTR,YLTR,CLTI,XLTI,YLTI                   PRESS     292
      GO TO 703                                                         PRESS     293
  702 WRITE (ITAPEW,418)CLTR,XLTR,YLTR                                  PRESS     294
  703 WRITE (ITAPEW,612)KL                                              PRESS     295
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     296
      CALL PICTUR(XCLR,FTA,MPTS,CLRN,ETAN,-100.0,0.0,1.0,50.0,2.0,1.0,  PRESS     297
     1MSYM,1,IAUX)                                                      PRESS     298
      IF(ZK)632,633,632                                                 PRESS     299
  632 WRITE (ITAPEW,613)KL                                              PRESS     300
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     301
      CALL PICTUR(XCLI,FTA,MPTS,CLIN,ETAN,-100.0,0.0,1.0,50.0,2.0,1.0,  PRESS     302
     1MSYM,1,IAUX)                                                      PRESS     303
  633 WRITE (ITAPEW,614)KL                                              PRESS     304
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     305
      CALL PICTUR(XCMR,FTA,MPTS,CMRN,ETAN,-100.0,0.0,1.0,50.0,2.0,1.0,  PRESS     306
     1MSYM,1,IAUX)                                                      PRESS     307
      IF(ZK)634,635,634                                                 PRESS     308
  634 WRITE (ITAPEW,615)KL                                              PRESS     309
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     310
      CALL PICTUR(XCMI,FTA,MPTS,CMIN,ETAN,-100.0,0.0,1.0,50.0,2.0,1.0,  PRESS     311
     1MSYM,1,IAUX)                                                      PRESS     312
  635 WRITE (ITAPEW,616)KL                                              PRESS     313
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     314
      CALL PICTUR(XCPR,FTA,MPTS,CPRN,ETAN,-100.0,0.0,1.0,50.0,2.0,1.0,  PRESS     315
     1MSYM,1,IAUX)                                                      PRESS     316
      IF(ZK)636,701,636                                                 PRESS     317
  636 WRITE (ITAPEW,617)KL                                              PRESS     318
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     319
      CALL PICTUR(XCPI,FTA,MPTS,CPIN,ETAN,-100.0,0.0,1.0,50.0,2.0,1.0,  PRESS     320
     1MSYM,1,IAUX)                                                      PRESS     321
  701 CONTINUE                                                          PRESS     322
C                                                                       PRESS     323
C                                                                       PRESS     324
C FORMATS                                                               PRESS     325
C                                                                       PRESS     326
  300 FORMAT (1H1,5X8HSURFACE ,I3,3X9HMACH NO.=,E10.3,3X45HREDUCED FREQU PRESS     327
     1ENCY BASED ON ROOT SEMI-CHORD = ,E10.3,//5X18HPRESSURE VARIATION, PRESS     328
     210X11HMODE NO. = ,I5)                                             PRESS     329
  301 FORMAT (//1H ,4X18HSPANWISE STATION =,1PE10.3)                    PRESS     330
  303 FORMAT (//97H      CHORDWISE STA     REAL PART       IMAG PART     PRESS     331
     1 AMPLITUDE       PHASE(RAD)      PHASE(DEG)//)                    PRESS     332
  304 FORMAT (5X,1P6E16.8)                                              PRESS     333
  306 FORMAT (1H1,4X28HLIFT AND MOMENT COEFFICIENTS,10X9HMODE NO.=, I3  PRESS     334
     1         //5X20HSECTION COEFFICIENTS,/)                           PRESS     335
  307 FORMAT (//97H     SPANWISE STATION    CL(REAL)        CL(IMAG)     PRESS     336
     1    CL(AMPL)       PHASE(RAD)     PHASE(DEG)//)                     PRESS     337
  308 FORMAT (//97H     SPANWISE STATION    CM(REAL)        CM(IMAG)     PRESS     338
     1    CM(AMPL)       PHASE(RAD)     PHASE(DEG)//)                     PRESS     339
  309 FORMAT (//49H     SPANWISE STATION    CP(REAL)        CP(IMAG)//) PRESS     340
```

```
      C                                                                 PRESS    227
            XCLR(1)=CLR(1)                                              PRESS    228
            XCMR(1)=CMR(1)                                              PRESS    229
            XCPR(1)=CPR(1)                                              PRESS    230
            IF(ZK.EQ.O.O)GO TO 413                                      PRESS    231
            CPI(1)=O.5-CPI(1)                                           PRESS    232
      C                                                                 PRESS    233
            XCLI(1)=CLI(1)                                              PRESS    234
            XCMI(1)=CMI(1)                                              PRESS    235
            XCPI(1)=CPI(1)                                              PRESS    236
            CALI = O.5*CLI(1)                                           PRESS    237
            CMIY=CMI(1)-CLI(1)/2.O                                      PRESS    238
            CMIX = O.O                                                  PRESS    239
        413 DO 12 I=2,KK                                                PRESS    240
            SURF =SURF+BBO(I)                                           PRESS    241
            CALR =CALR+CLR(I)                                           PRESS    242
            CMRY=CMRY+2.O*CMR(I)*BBO(I)-(1.O+XM(I))*CLR(I)              PRESS    243
            CMRX=CMRX+FTA(I)*CLR(I)                                     PRESS    244
            CLR(I)=CLR(I)/BBO(I)                                        PRESS    245
            CMR(I)=CMR(I)/BBO(I)                                        PRESS    246
            CPR(I)=O.5-CPR(I)                                           PRESS    247
      C                                                                 PRESS    248
            XCLR(I)=CLR(I)                                              PRESS    249
            XCMR(I)=CMR(I)                                              PRESS    250
            XCPR(I)=CPR(I)                                              PRESS    251
            IF(ZK.EQ.O)GO TO 12                                         PRESS    252
            CALI =CALI+CLI(I)                                           PRESS    253
            CMIY=CMIY+2.O*CMI(I)*BBO(I)-(1.O+XM(I))*CLI(I)              PRESS    254
            CMIX=CMIX+FTA(I)*CLI(I)                                     PRESS    255
            CLI(I)=CLI(I)/BBO(I)                                        PRESS    256
            CMI(I)=CMI(I)/BBO(I)                                        PRESS    257
            CL(I)=CL(I)/BBO(I)                                          PRESS    258
            CM(I)=CM(I)/BBO(I)                                          PRESS    259
            CPI(I)=O.5-CPI(I)                                           PRESS    260
      C                                                                 PRESS    261
            XCLI(I)=CLI(I)                                              PRESS    262
            XCMI(I)=CMI(I)                                              PRESS    263
            XCPI(I)=CPI(I)                                              PRESS    264
         12 CONTINUE                                                    PRESS    265
            CLTR =CALR/SURF                                             PRESS    266
            XLTR=-CMRY/CALR*ABO                                         PRESS    267
            YLTR=CMRX/CALR*ALO                                          PRESS    268
            IF(ZK.EQ.O.O)GO TO 414                                      PRESS    269
            CLTI = CALI/SURF                                            PRESS    270
            XLTI=-CMIY/CALI*ABO                                         PRESS    271
            YLTI=CMIX/CALI*ALO                                          PRESS    272
        414 CONTINUE                                                    PRESS    273
            WRITE (ITAPEW,306)KL                                        PRESS    274
            WRITE (ITAPEW,650)ISI,ZM,ZK                                 PRESS    275
            DO 305 K =1,KK                                              PRESS    276
            AK = K                                                      PRESS    277
        305 ETAS(K) = (AK-1.O)*STEPY                                    PRESS    278
            IF (ZK) 416,416,415                                         PRESS    279
        415 WRITE (ITAPEW,307)                                          PRESS    280
            WRITE (ITAPEW,304)(ETAS(K),CLR(K),CLI(K),CL(K),PHAR(K),     PRESS    281
           1             PHAD(K),K=1,KK)                                PRESS    282
            WRITE (ITAPEW,308)                                          PRESS    283
```

```
   16 AL = 0.0                                                          PRESS     170
      AM = 0.0                                                          PRESS     171
   17 CLR(K)=CLR(K)+ACO(N,J)*AL                                         PRESS     172
      CMR(K)=CMR(K)+ACO(N,J)*AM                                         PRESS     173
      IF (ZK) 251,251,406                                               PRESS     174
  406 CLI(K)=CLI(K)+ACOI(N,J)*AL                                        PRESS     175
      CMI(K)=CMI(K)+ACOI(N,J)*AM                                        PRESS     176
  251 CONTINUE                                                          PRESS     177
      CLR(K) = CLR(K)*ALBP*4.0                                          PRESS     178
      CMR(K) = CMR(K)*ALBP*2.0                                          PRESS     179
      IF (ZK) 407,407,408                                               PRESS     180
  408 CLI(K) = CLI(K)*ALBP*4.0                                          PRESS     181
      CMI(K) = CMI(K)*ALBP*2.0                                          PRESS     182
      CL(K) = SQRT(CLR(K)*CLR(K)+CLI(K)*CLI(K))                         PRESS     183
      PHAR(K) = FATAN(CLI(K),CLR(K))                                    PRESS     184
      PHAD(K) = PHAR(K)*RTD                                             PRESS     185
      CM(K) = SQRT(CMR(K)*CMR(K)+CMI(K)*CMI(K))                         PRESS     186
      PHMR(K) = FATAN(CMI(K),CMR(K))                                    PRESS     187
      PHMD(K) = PHMR(K)*RTD                                             PRESS     188
  407 CPR(K) = 0.0                                                      PRESS     189
      CPI(K) = 0.0                                                      PRESS     190
      IF(K.EQ.1.AND.LL.EQ.0)GO TO 600                                   PRESS     191
      CPR(K)=CMR(K)/CLR(K)                                              PRESS     192
      IF(ZK)600,600,410                                                 PRESS     193
  410 CPI(K)=CMI(K)/CLI(K)                                              PRESS     194
  600 IF (NPRES)409,200,409                                             PRESS     195
  409 IF(LINE.EQ.0)WRITE (ITAPEW,300)ISI,ZM,ZK,KL                       PRESS     196
      LINE=LINE+10+III                                                  PRESS     197
      NZL=50-III                                                        PRESS     198
      IF(LINE.GT.NZL)LINE=0                                             PRESS     199
      WRITE (ITAPEW,301)ETA                                             PRESS     200
      IF (ZK) 412,412,411                                               PRESS     201
  411 WRITE (ITAPEW,303)                                                PRESS     202
      WRITE (ITAPEW,304)(XJ(I),PRESR(I),PRESI(I),PRES(I),PHRP(I),       PRESS     203
     1          PHDP(I),I=1,III)                                        PRESS     204
      GO TO 200                                                         PRESS     205
  412 WRITE (ITAPEW,421)                                                PRESS     206
      WRITE (ITAPEW,391)(XJ(I),PRESR(I),I=1,III)                        PRESS     207
  200 CONTINUE                                                          PRESS     208
      IF(NPRES.EQ.0)GO TO 900                                           PRESS     209
      WRITE (ITAPEW,609)KL                                              PRESS     210
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     211
      CALL PICTUR(APRESR,AXI,NPTS,PREAL,XINA,-100.0,0.0,1.0,50.0,2.0,1.0 PRESS     212
     1,NSYM,1,IAUX)                                                     PRESS     213
      IF(ZK)630,900,630                                                 PRESS     214
  630 WRITE (ITAPEW,611)KL                                              PRESS     215
      WRITE (ITAPEW,650)ISI,ZM,ZK                                       PRESS     216
      CALL PICTUR(APRESI,AXI,NPTS,PRIMA,XINA,-100.0,0.0,1.0,50.0,2.0,1.0 PRESS     217
     1,NSYM,1,IAUX)                                                     PRESS     218
  900 CONTINUE                                                          PRESS     219
C     TOTAL LIFT AND C.P. CALCULATION                                   PRESS     220
      IF(NCL)602,701,602                                                PRESS     221
  602 SURF = 0.5*(1.0+BBT)                                              PRESS     222
      CALR = 0.5*CLR(1)                                                 PRESS     223
      CMRY=CMR(1)-CLR(1)/2.0                                            PRESS     224
      CMRX = 0.0                                                        PRESS     225
      CPR(1)=0.5-CPR(1)                                                 PRESS     226
```

```
      IF(NPRES.EQ.0)GO TO 404                                   PRESS  113
      DO 250 I =2,III                                           PRESS  114
      XI(I) = XI(I-1) - STEPX                                   PRESS  115
      XJ(I)=0.5*(1.0+XI(I))                                     PRESS  116
      IPR=I+(K-1)*III                                           PRESS  117
      AXI(IPR)= XJ(I)                                           PRESS  118
      PRESR(I) = 0.0                                            PRESS  119
      PRESI(I) = 0.0                                            PRESS  120
      DO 250 N =1,MCC                                           PRESS  121
      IF(N-1)170,170,171                                        PRESS  122
  170 CLFT=SQRT((1.0-XI(I))/(1.0+XI(I)))                        PRESS  123
      GO TO 172                                                 PRESS  124
  171 CK=SQRT(1.0-XI(I)*XI(I))                                  PRESS  125
      CLFT=CK*XI(I)**(N-2)                                      PRESS  126
  172 SLFT=SQRT(1.0-ETA*ETA)                                    PRESS  127
      DO 250 J =1,NLRR                                          PRESS  128
      MJ=2*J-1-LL                                               PRESS  129
      IF (MJ) 7,7,8                                             PRESS  130
    7 GO TO (9,10,10,10,10),J                                   PRESS  131
    9 CS = CLFT*SLFT                                            PRESS  132
      GO TO 11                                                  PRESS  133
    8 IF (K-1) 10,10,32                                         PRESS  134
   32 CS = CLFT*SLFT*ETA**MJ                                    PRESS  135
      GO TO 11                                                  PRESS  136
   10 CS = 0.0                                                  PRESS  137
   11 PRESR(I)=PRESR(I)+ACO(N,J)*CS*ALBQ/BBO(K)                 PRESS  138
      IF (ZK) 250,250,403                                       PRESS  139
  403 PRESI(I)=PRESI(I)+ACOI(N,J)*CS*ALBQ/BBO(K)                PRESS  140
  250 CONTINUE                                                  PRESS  141
      DO 201 I=1,III                                            PRESS  142
      IF(ZK)670,670,671                                         PRESS  143
  671 CONTINUE                                                  PRESS  144
      PRES(I) = SQRT(PRESR(I)*PRESR(I)+PRESI(I)*PRESI(I))       PRESS  145
      PHRP(I) = FATAN(PRESI(I),PRESR(I))                        PRESS  146
      PHDP(I)=PHRP(I)*RTD                                       PRESS  147
  670 IPR=I+(K-1)*III                                           PRESS  148
      APRESR(IPR)=PRESR(I)                                      PRESS  149
      IF(ZK.EQ.0.0)GO TO 201                                    PRESS  150
      APRESI(IPR)=PRESI(I)                                      PRESS  151
  201 CONTINUE                                                  PRESS  152
  404 IF(NCL)601,600,601                                        PRESS  153
  601 CLR(K)=0                                                  PRESS  154
      CMR(K)=0                                                  PRESS  155
      CLI(K)=0                                                  PRESS  156
      CMI(K)=0                                                  PRESS  157
      DO 251 N =1,MCC                                           PRESS  158
      DO 251 J =1,NLRR                                          PRESS  159
      MJ=2*J-1-LL                                               PRESS  160
      IF (MJ) 13,13,14                                          PRESS  161
   13 GO TO (15,14,14,14,14),J                                  PRESS  162
   15 AL = A(N)*SLFT                                            PRESS  163
      AM = B(N)*SLFT                                            PRESS  164
      GO TO 17                                                  PRESS  165
   14 IF (K-1) 16,16,18                                         PRESS  166
   18 AL = A(N)*SLFT*ETA**MJ                                    PRESS  167
      AM = B(N)*SLFT*ETA**MJ                                    PRESS  168
      GO TO 17                                                  PRESS  169
```

```
      B(3) =-0.125                                                  PRESS      56
      B(4)=0                                                        PRESS      57
      B(5) =-0.0625                                                 PRESS      58
      IF (LC(33).NE.0.OR.LC(1).EQ.2)  ZK = 0.                       PRESS      59
      NS=NMOD                                                       PRESS      60
      LL = 1 - IND                                                  PRESS      61
      AIII=III                                                      PRESS      62
      STEPX=2.0/AIII                                                PRESS      63
      AKK=KK                                                        PRESS      64
      STEPY=1.0/AKK                                                 PRESS      65
      NPTS=0                                                        PRESS      66
      MPTS=0                                                        PRESS      67
      DO 651 IP=1,20                                                PRESS      68
      NSYM(IP)=0                                                    PRESS      69
      MSYM(IP)=0                                                    PRESS      70
      IF(IP.LE.KK)NSYM(IP)=III                                      PRESS      71
      IF(IP.LE.1)MSYM(IP)=KK                                        PRESS      72
      NPTS=NPTS+NSYM(IP)                                            PRESS      73
  651 MPTS=MPTS+MSYM(IP)                                            PRESS      74
      DO 701 KL=1,NS                                                PRESS      75
      ETA = -STEPY                                                  PRESS      76
      LINE=0                                                        PRESS      77
      DO 200 K=1,KK                                                 PRESS      78
      ETA=ETA+STEPY                                                 PRESS      79
      IPR=1+(K-1)*III                                               PRESS      80
      XI(1)=1.0-STEPX/2.0                                           PRESS      81
      XJ(1)=0.5*(1.0+XI(1))                                         PRESS      82
      AXI(IPR)=XJ(1)                                                PRESS      83
      FTA(K)=ETA                                                    PRESS      84
      L=0                                                           PRESS      85
      PRESR(1)=0                                                    PRESS      86
      PRESI(1)=0                                                    PRESS      87
      DO 150 N =1,MCC                                               PRESS      88
      IF(N-1)160,160,161                                            PRESS      89
  160 CLFT=SQRT((1.0-XI(1))/(1.0+XI(1)))                            PRESS      90
      GO TO 162                                                     PRESS      91
  161 CK=SQRT(1.0-XI(1)*XI(1))                                      PRESS      92
      CLFT=CK*XI(1)**(N-2)                                          PRESS      93
  162 SLFT=SQRT(1.0-ETA*ETA)                                        PRESS      94
      DO 150 J=1,NLRR                                               PRESS      95
      MJ=2*J-1-LL                                                   PRESS      96
      IF (MJ) 1,1,2                                                 PRESS      97
    1 GO TO (3,4,4,4,4),J                                           PRESS      98
    3 CS = CLFT*SLFT                                                PRESS      99
      GO TO 5                                                       PRESS     100
    2 IF (K-1) 4,4,6                                                PRESS     101
    6 CS = CLFT*SLFT*ETA**MJ                                        PRESS     102
      GO TO 5                                                       PRESS     103
    4 CS = 0.0                                                      PRESS     104
    5 L = L + 1                                                     PRESS     105
      ACO(N,J)=AR(L,KL)                                             PRESS     106
      IF (ZK) 400,400,401                                           PRESS     107
  401 ACOI(N,J)=AI(L,KL)                                            PRESS     108
  400 PRESR(1)=PRESR(1)+ACO(N,J)*CS*ALBQ/BBO(K)                     PRESS     109
      IF (ZK) 150,150,402                                           PRESS     110
  402 PRESI(1)=PRESI(1)+ACOI(N,J)*CS*ALBQ/BBO(K)                    PRESS     111
  150 CONTINUE                                                      PRESS     112
```

```
                                                                          UNISLV      59
                                                                          UNISLV      60
                                                                          UNISLV      61
      SUBROUTINE PRESS (AR,AI,IND)                                        PRESS        2
C                                                                         PRESS        3
      DIMENSION         XI(20) ,     AR(25,20) ,     AI(25,20)            PRESS        4
      DIMENSION       ACO(5,5) ,     ACOI(5,5) ,       CLR(20)            PRESS        5
      DIMENSION        CLI(20) ,       CMI(20) ,       CPR(20)            PRESS        6
      DIMENSION        CPI(20) ,          A(5) ,          B(5)            PRESS        7
      DIMENSION      PRESR(20) ,     PRESI(20) ,       CMR(20)            PRESS        8
      DIMENSION         XJ(20) ,      PHAR(20) ,      PHAD(20)            PRESS        9
      DIMENSION       PRES(20) ,      PHRP(20) ,      PHDP(20)            PRESS       10
      DIMENSION         CM(20) ,      PHMR(20) ,      PHMD(20)            PRESS       11
      DIMENSION       ETAS(20) ,        CL(20) ,      AXI(400)            PRESS       12
      DIMENSION    APRESR(400) ,   APRESI(400) ,     IAUX(400)            PRESS       13
      DIMENSION        FTA(20) ,      XCLR(20) ,      XCLI(20)            PRESS       14
      DIMENSION       XCMR(20) ,      XCMI(20) ,      NSYM(20)            PRESS       15
      DIMENSION       XCPR(20) ,      XCPI(20) ,      MSYM(20)            PRESS       16
      DIMENSION      PREAL(12) ,     PRIMA(12) ,      XINA(12)            PRESS       17
      DIMENSION       ETAN(12) ,      CLRN(12) ,      CLIN(12)            PRESS       18
      DIMENSION       CMRN(12) ,      CMIN(12) ,      CPRN(12)            PRESS       19
      DIMENSION       CPIN(12)                                            PRESS       20
      DIMENSION ITAPES(50)                                                PRESS       21
      COMMON /COMA/ LC(40) , BR                                           PRESS       22
      COMMON /COMB  / ISI,M,IRR,NZ,IS,LIRR,NO1,NO2,NMOD,ABO,ALO,M2        PRESS       23
      COMMON/COMC/NPRES,NCL,III,KK,NPRD,XM(20),BBO(20),BBT                PRESS       24
      COMMON/COMF/MCC,NLRR,NNP,Z3A                                        PRESS       25
      COMMON/COMI/ZK,ZKX,YOE,YOEX                                         PRESS       26
      COMMON/COMJ/ZM                                                      PRESS       27
      COMMON / CTAPES / ITAPES                                            PRESS       28
      DATA     PREAL/1H ,1HP,1HR,1HE,1HS,1HS,1H-,1HR,1HE,1HA,1HL,1H /     PRESS       29
      DATA     PRIMA/1H ,1HP,1HR,1HE,1HS,1HS,1H-,1HI,1HM,1HA,1HG,1H /     PRESS       30
      DATA      XINA/1H ,1H ,1H ,1H ,1HX,1HI,1H ,1H ,1H ,1H ,1H ,1H /     PRESS       31
      DATA      ETAN/1H ,1H ,1H ,1H ,1HE,1HT,1HA,1H ,1H ,1H ,1H ,1H /     PRESS       32
      DATA      CLRN/1H ,1H ,1HC,1HL,1H-,1HR,1HE,1HA,1HL,1H ,1H ,1H /     PRESS       33
      DATA      CLIN/1H ,1H ,1HC,1HL,1H-,1HI,1HM,1HA,1HG,1H ,1H ,1H /     PRESS       34
      DATA      CMRN/1H ,1H ,1HC,1HM,1H-,1HR,1HE,1HA,1HL,1H ,1H ,1H /     PRESS       35
      DATA      CMIN/1H ,1H ,1HC,1HM,1H-,1HI,1HM,1HA,1HG,1H ,1H ,1H /     PRESS       36
      DATA      CPRN/1H ,1H ,1HC,1HP,1H-,1HR,1HE,1HA,1HL,1H ,1H ,1H /     PRESS       37
      DATA      CPIN/1H ,1H ,1HC,1HP,1H-,1HI,1HM,1HA,1HG,1H ,1H ,1H /     PRESS       38
C     STEPX=INC ALONG CHORD                                               PRESS       39
C     STEPY=INC ALONG SPAN                                                PRESS       40
C                                                                         PRESS       41
C                                                                         PRESS       42
      ITAPEW = ITAPES(6)                                                  PRESS       43
C                                                                         PRESS       44
C                                                                         PRESS       45
      RTD = 180.0/3.1415927                                               PRESS       46
      ALBP = ALO/ABO*3.1415927                                            PRESS       47
      ALBQ = ALO/ABO*8.0                                                  PRESS       48
      A(1) = 1.0                                                          PRESS       49
      A(2) = 0.5                                                          PRESS       50
      A(3)=0                                                              PRESS       51
      A(4) = 0.125                                                        PRESS       52
      A(5)=0                                                              PRESS       53
      B(1) = 0.5                                                          PRESS       54
      B(2)=0                                                              PRESS       55
```

```
EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CALF           2                  O ALF     (2)

STATISTICS
  PROGRAM LENGTH                227B      151
        52000B CM USED
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3 UNISLV            1            56

VARIABLES      SN  TYPE            RELOCATION
    O  A           REAL       ARRAY     F.P.      REFS          5        22      2*30      2*31      2*37      2*38      2*39
                                                    49       2*52      2*53      2*54   DEFINED         1
  200  ALF         REAL       ARRAY               REFS          5         6        23        24        25        26      2*30
                                                  2*31         38        39        40        50        51      2*53      2*54
                                               DEFINED         23        24        37        38        50        51
    O  BETA        REAL       ARRAY     F.P.      REFS          5        23        24   DEFINED         1
  200  CALF        COMPLEX                        REFS          4         6   DEFINED        22        49
  171  I           INTEGER                        REFS         21        22        23        24   DEFINED        20
  166  IB          INTEGER                        REFS         21        22        33   DEFINED        14        33
  175  II          INTEGER                        REFS       2*37      2*38      2*39        48        49      2*52      2*53
                                                  2*54    DEFINED        36        48
  170  IKY         INTEGER                        REFS         23        24      2*25      2*26        27        32      2*38
                                                  3*39         40        47        49        50        51        53        54
                                               DEFINED         16        32        35        47
  172  I1I         INTEGER                        REFS         28        36   DEFINED        21
  174  JI          INTEGER                        REFS       2*30      2*31   DEFINED        28
  173  JKY         INTEGER                        REFS         29      2*30      2*31   DEFINED        27        29
  165  K         * INTEGER                     DEFINED         13
  164  KBY         INTEGER                        REFS         16        22        35        55   DEFINED         9        55
  176  KOUNT       INTEGER                        REFS         49   DEFINED        46
    O  L           INTEGER              F.P.      REFS         15        22   DEFINED         1
  163  LEAP        INTEGER                        REFS         35        41   DEFINED         8
  167  LI          INTEGER                        REFS         28        34   DEFINED        15        34
    O  M           INTEGER              F.P.      REFS          8        20        46   DEFINED         1
    O  MID         INTEGER              F.P.      REFS          7        33        34        49        55
                                               DEFINED          1
  162  MID1        INTEGER                        REFS         48   DEFINED         7
    O  N           INTEGER              F.P.      REFS         13   DEFINED         1
  177  TEMP        REAL                           REFS         53        54   DEFINED        52
    O  Y           REAL       ARRAY     F.P.      REFS          5        22        23        24        25        26        30
                                                    31       2*38      2*39        49        50        51
                                               DEFINED          1        25        26        30        31        39        40
                                                    53         54

EXTERNALS          TYPE    ARGS         REFERENCES
      DUPER        COMPLEX   5                4        22        49

STATEMENT LABELS              DEF LINE    REFERENCES
    O  100                         31          28
    O  110                         34          20
    O  120          INACTIVE       46          41
    O  130                         54          46
  136  140                         55          13      2*41

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   13  140      K          13 55       127B               EXT REFS  NOT INNER
   20  110      I          20 34        52B               EXT REFS  NOT INNER
   51  100      JI         28 31        11B        OPT
  107  130      KOUNT      46 54        27B               EXT REFS
```

```
COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
                                    3 NZ       (1)          4 IS      (1)          5 LIRR    (1)
                                    6 NO1      (1)          7 NO2     (1)          8 NMOD    (1)
                                    9 ABO      (1)         10 ALO     (1)         11 M2      (1)
     COMC          46               0 NPRES    (1)          1 NCL     (1)          2 III     (1)
                                    3 KK       (1)          4 NPRD    (1)          5 XM      (20)
                                   25 BBO      (20)        45 BBT     (1)
     COMF           4               0 MCC      (1)          1 NLRR    (1)          2 NNP     (1)
                                    3 Z3A      (1)
     COMI           4               0 ZK       (1)          1 ZKX     (1)          2 YOE     (1)
                                    3 YOEX     (1)
     COMJ           1               0 ZM       (1)
     CTAPES        50               0 ITAPES   (50)

STATISTICS
  PROGRAM LENGTH                 6722B     3538
  CM LABELED COMMON LENGTH        236B      158
        52000B CM USED
```

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      SUBROUTINE SOLFLT (ISAVFO)                                        SOLFLT   2
C                                                                       SOLFLT   3
C     CALLING PROGRAM FOR FLUTTER ROUTINES                              SOLFLT   4
C                                                                       SOLFLT   5
      INTEGER YES                                                       SOLFLT   6
C                                                                       SOLFLT   7
CIBM                                                                    SOLFLT   8
C     DIMENSION TITLE(18)                                               SOLFLT   9
CIBM                                                                    SOLFLT  10
CCDC                                                                    SOLFLT  11
      DIMENSION TITLE(8)                                                SOLFLT  12
CCDC                                                                    SOLFLT  13
      DIMENSION BB(40,40), OMGA(40), NIND(40)                           SOLFLT  14
      DIMENSION ITAPES(50)                                              SOLFLT  15
      DIMENSION VBO(30), RVBO(15)                                       SOLFLT  16
      DIMENSION   NAME1(2),  NAME2(2)                                   SOLFLT  17
      DIMENSION TSHF(1)             ,SRATIO(21)                         SOLFLT  18
      DIMENSION OMGC(40)                                                SOLFLT  19
      DIMENSION TFH(1)                                                  SOLFLT  20
C                                                                       SOLFLT  21
      COMMON /COMA/ LC(40) , BR                                         SOLFLT  22
      COMMON /MODD/ B(40,40), DETAD(40,40), WW(40,40), OMG(40), NC      SOLFLT  23
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                 SOLFLT  24
      COMMON /FLUTC/ RHOR(10), NOTI(25), NINZ(40,25), RATOM(20)         SOLFLT  25
      COMMON /FLUTV / VL,VH, FLO,FHI, IE, NQZ, NVTOT                    SOLFLT  26
      COMMON /FLEXT / BB,OMGA, RHO, VB                                  SOLFLT  27
      COMMON / FITR / NOMI, NIND                                        SOLFLT  28
      COMMON / CTAPES / ITAPES                                          SOLFLT  29
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   SOLFLT  30
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                      SOLFLT  31
      COMMON /REPORT/ KREPOR                                            SOLFLT  32
      COMMON /CHEAD / KHEAD ,KRETUR,KOLUMN,IR,JCL,JCU,LSUB,LSKIP        SOLFLT  33
      COMMON /CTSHF / LTSHF ,TSHF                                       SOLFLT  34
      COMMON /CONSTS/ NO    ,YES                                        SOLFLT  35
      COMMON /CTFH  / KTFH  ,LTFH  ,TFH                                 SOLFLT  36
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              SOLFLT  37
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA SOLFLT  38
     1                ,ITAPET                                           SOLFLT  39
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT,  SOLFLT  40
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, SOLFLT  41
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                          SOLFLT  42
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, SOLFLT  43
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,         SOLFLT  44
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       SOLFLT  45
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   SOLFLT  46
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         SOLFLT  47
     5               IUDESI,IFDESI,IUWTI,IFWTI,                         SOLFLT  48
     6               IUMEMO,IFMEMO,IUBT,IFBT,                           SOLFLT  49
     7               IUDESN,IFDESN,IUMD,IFMD,                           SOLFLT  50
     8               IUMEMF,IFMEMF,                                     SOLFLT  51
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, SOLFLT  52
     A               IUDESF,IFDESF,IUWT,IFWT,                           SOLFLT  53
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,         SOLFLT  54
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,     SOLFLT  55
     D               IUBR,IFBR,                                         SOLFLT  56
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                       SOLFLT  57
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,       SOLFLT  58
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```
     G            IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK                 SOLFLT    59
C                                                                       SOLFLT    60
      COMPLEX   B, DETAD, BB                                            SOLFLT    61
C                                                                       SOLFLT    62
C INITIAL CONDITIONS                                                    SOLFLT    63
C                                                                       SOLFLT    64
      CALL PROGNA (4H(SOL, 4HFLT))                                      SOLFLT    65
      LSKIP  =  1                                                       SOLFLT    66
      LSUB   =  4                                                       SOLFLT    67
      KRETUR =  0                                                       SOLFLT    68
      SRATIO(1) =  1.0                                                  SOLFLT    69
      DO 50 I=1,20                                                      SOLFLT    70
      I1     =  I + 1                                                   SOLFLT    71
   50 SRATIO(I1)=  RATOM(I)                                             SOLFLT    72
      KOLUMN =  8                                                       SOLFLT    73
      IF (KREPOR .EQ. YES) KOLUMN = 4                                   SOLFLT    74
      TWOPI  =  6.283184                                                SOLFLT    75
      ITAP18 =  ITAPES(18)                                              SOLFLT    76
      NMODES =  LC(2)                                                   SOLFLT    77
      NRHOV =  LC(5)                                                    SOLFLT    78
      NMODV  =  LC(25) + 1                                              SOLFLT    79
      NSTIV  =  LC(26) + 1                                              SOLFLT    80
      MTAP1  =  ITAPES(37)                                              SOLFLT    81
      MTAP2  =  ITAPES(22)                                              SOLFLT    82
      ITAPE  =  ITAPES(50)                                              SOLFLT    83
      KFIRST =  YES                                                     SOLFLT    84
C                                                                       SOLFLT    85
C                                                                       SOLFLT    86
C PRINT PLOT LOOP FOR NUMBER OF DENSITY VARIATIONS                      SOLFLT    87
C                                                                       SOLFLT    88
C NOTE THAT ADDITIONAL INFORMATION HAS BEEN ADDED ON UNIT MTAP1 IN      SOLFLT    89
C PROGRAM FLINFO                                                        SOLFLT    90
      KTFH   =  YES                                                     SOLFLT    91
      DO 300 IRHOV=1,NRHOV                                              SOLFLT    92
      RHOP   =  RHOR(IRHOV)                                             SOLFLT    93
      IF (LC(14) .EQ. 0)  GOTO 25                                       SOLFLT    94
      WRITE (MTAP1)  RHOP,FMACH                                         SOLFLT    95
   25 CONTINUE                                                          SOLFLT    96
      RHO      =  RHOP * 0.076474                                       SOLFLT    97
C                                                                       SOLFLT    98
C                                                                       SOLFLT    99
C PRINT PLOT LOOP FOR NUMBER OF STIFFNESS VARIATION CYCLES              SOLFLT   100
C                                                                       SOLFLT   101
      DO 200 ISTIV=1,NSTIV                                              SOLFLT   102
      REWIND ITAP18                                                     SOLFLT   103
      WRITE (ITAP18,900) NPASS, FMACH, RHOP, SRATIO(ISTIV)              SOLFLT   104
      REWIND ITAP18                                                     SOLFLT   105
      READ  (ITAP18,910) (TFH(L), L=1,LTFH)                             SOLFLT   106
      REWIND ITAP18                                                     SOLFLT   107
      READ (ITAP18,3000) TITLE                                          SOLFLT   108
      KOUNT  =  LINES                                                   SOLFLT   109
      CALL TITLES (2)                                                   SOLFLT   110
      IF (KFIRST .EQ. NO) GO TO 80                                      SOLFLT   111
      KFIRST =  NO                                                      SOLFLT   112
      NROWS  =  1                                                       SOLFLT   113
      NCOLS  =  0                                                       SOLFLT   114
      KTABLE =  2                                                       SOLFLT   115
```

```
      IF (LC(1) .NE. 1) GO TO 60
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1500)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 4
      CALL PTABLE (2,35,35HFLUTTER ANALYSIS USING THE K METHOD)
      GO TO 70
   60 IF (LC(1) .NE.-1) GO TO 70
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1510)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 4
      CALL PTABLE (2,37,37HFLUTTER ANALYSIS USING THE P-K METHOD)
   70 CONTINUE
   80 CONTINUE
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES
      CALL TITLES (2)
      NROWS  =  1
      NCOLS  =  0
      KTABLE =  2
      CALL PTABLE (2,60,TITLE)
      CALL TITLES (2)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,4010)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 4
      WRITE (ITAPEW,1100) RHO
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 2
      NROWS  =  1
      NCOLS  =  2
      KTABLE =  2
      CALL PTABLE (2,18,18
     1   HDENSITY VARIATIONS)
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES
      CALL TITLES (2)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,4020)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 4
      NROWS  =  1
      NCOLS  =  2
      KTABLE =  2
      CALL PTABLE (2,20,20
     1   HFREQUENCY VARIATIONS)
C
C
      DO 3 I=1,NMODES
      OMGA(I)  = OMG(I)
      DO 3 J=1,NMODES
    3 BB(I,J)  =  B(I,J)
      MELIM  =  LC(27)
      IF (ISTIV .EQ. 1) MELIM = 0
      IF ((LINES-KOUNT) .LT. 2) KOUNT = LINES
      CALL TITLES (2)
      WRITE (ITAPEW,100) MELIM
      CALL PLB (1,1,ITAPEW)
```

```
      KOUNT  =  KOUNT + 2
      INMD   =  LC(27)
      IF (INMD.EQ.O)  GO TO 8
      OMGA(INMD) = OMG(INMD)*SRATIO(ISTIV)
    8 CONTINUE
      IF ( LC(1) .EQ. -1 .OR. ( LC(1) .GT. O .AND. INMD .NE. LC(11) ) )
     1            GO TO 5
      DO 6 I=1,NMODES
      IF ( I .EQ. INMD )       GO TO 6
      BB(I,I)=  BB(I,I)/(SRATIO(ISTIV)**2)
    6 CONTINUE
      GO TO 7
    5 CONTINUE
      IF (INMD.EQ.O)  GO TO 7
      BB(INMD,INMD) = BB(INMD,INMD) * (SRATIO(ISTIV)*SRATIO(ISTIV))
    7 CONTINUE
C
C
C LIST GENERALIZED MASSES, FREQUENCIES, DAMPING, AND COMPLEX STIFFNESS
C
C
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES
      CALL TITLES (2)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1610)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 4
      NCOLS  =  4
      NROWS  =  O
      KTABLE =  2
      CALL PTABLE (2,48,48
     1   HGENERALIZED MASS, FREQUENCY, AND MODAL STIFFNESS)
      LSKIP  =  1
      LSUB   =  4
      KRETUR =  O
  215 CALL HEAD (LTSHF,TSHF,NMODES,NMODES)
      GO TO (216, 217, 218), KHEAD
  216 WRITE (ITAPEW,1010)
  217 CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1011) (JC, JC=JCL,JCU)
  218 WRITE (ITAPEW,1012)  IR, (WW(IR,JC), JC=JCL,JCU)
      IF (KRETUR .LT. 3) GO TO 215
C
      LSUB   =  5
  235 CALL HEAD (LTSHF,TSHF,NMODES,2)
      GO TO (236, 237, 238), KHEAD
  236 WRITE (ITAPEW,2010)
  237 CALL PLB (1,1,ITAPEW)
  238 OMGC(IR) =  OMGA(IR)/TWOPI
      WRITE (ITAPEW,1012) IR, OMGC(IR), OMGA(IR)
      IF (KRETUR .LT. 3) GO TO 235
C
      KSAVE  =  KOLUMN
      KOLUMN =  KOLUMN/2
      LSUB   =  4
  315 CALL HEAD (LTSHF,TSHF,NMODES,NMODES)
      GO TO (316, 317, 318), KHEAD
```

```
  316 WRITE (ITAPEW,3010)                                         SOLFLT   230
  317 CALL PLB (1,1,ITAPEW)                                       SOLFLT   231
      WRITE (ITAPEW,3011) (JC, JC=JCL,JCU)                        SOLFLT   232
  318 WRITE (ITAPEW,3012)  IR, (BB(IR,JC), JC=JCL,JCU)            SOLFLT   233
      IF (KRETUR .LT. 3) GO TO 315                                SOLFLT   234
      KOLUMN =  KSAVE                                             SOLFLT   235
C                                                                 SOLFLT   236
C                                                                 SOLFLT   237
C PRINT PLOT LOOP FOR NUMBER OF MODAL ELIMINATION CYCLES          SOLFLT   238
C                                                                 SOLFLT   239
    4 CONTINUE                                                    SOLFLT   240
      DO 105 IMODV=1,NMODV                                        SOLFLT   241
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES                     SOLFLT   242
      CALL TITLES (2)                                             SOLFLT   243
      CALL PLB (1,2,ITAPEW)                                       SOLFLT   244
      WRITE (ITAPEW,4030)                                         SOLFLT   245
      CALL PLB (1,1,ITAPEW)                                       SOLFLT   246
      KOUNT  =  KOUNT + 5                                         SOLFLT   247
      NROWS  =  1                                                 SOLFLT   248
      NCOLS  =  2                                                 SOLFLT   249
      KTABLE =  2                                                 SOLFLT   250
      CALL PTABLE (2,28,28                                        SOLFLT   251
     1   HMODAL ELIMINATION VARIATIONS)                           SOLFLT   252
      IE     =  IMODV                                             SOLFLT   253
      REWIND MTAP2                                                SOLFLT   254
      IF (IMODV .EQ. 1) GO TO 11                                  SOLFLT   255
      ITRA     =  IE - 1                                          SOLFLT   256
      NOMI     =  NOTI(ITRA)                                      SOLFLT   257
      DO 12  ITC = 1,NOMI                                         SOLFLT   258
   12 NIND(ITC)  =  NINZ(ITC,ITRA)                                SOLFLT   259
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES                     SOLFLT   260
      CALL TITLES (2)                                             SOLFLT   261
      WRITE (ITAPEW,140) NOMI, (NIND(I), I=1,NOMI)                SOLFLT   262
      CALL PLB (1,1,ITAPEW)                                       SOLFLT   263
      KOUNT  =  KOUNT + 4                                         SOLFLT   264
      GO TO 40                                                    SOLFLT   265
   11 CONTINUE                                                    SOLFLT   266
      IF ((LINES-KOUNT) .LT. 2) KOUNT = LINES                     SOLFLT   267
      CALL TITLES (2)                                             SOLFLT   268
      WRITE (ITAPEW,145)                                          SOLFLT   269
      CALL PLB (1,1,ITAPEW)                                       SOLFLT   270
      KOUNT  =  KOUNT + 2                                         SOLFLT   271
   40 CONTINUE                                                    SOLFLT   272
      IF (LC(1) .NE. -1) GO TO 13                                 SOLFLT   273
      CALL FLOP (FMACH,RHOP,SRATIO,ISAVFO,KFIRST)                 SOLFLT   274
      GOTO 20                                                     SOLFLT   275
   13 CONTINUE                                                    SOLFLT   276
      CALL EIGM (RHOP,IRHOV,ISTIV)                                SOLFLT   277
      IF (LC(1).EQ.2) GOTO 10                                     SOLFLT   278
   20 REWIND MTAP2                                                SOLFLT   279
      CALL PRPLT (FMACH, RHOP, ISAVFO)                            SOLFLT   280
   10 CONTINUE                                                    SOLFLT   281
  105 CONTINUE                                                    SOLFLT   282
  200 CONTINUE                                                    SOLFLT   283
  300 CONTINUE                                                    SOLFLT   284
      KTFH   =  NO                                                SOLFLT   285
C                                                                 SOLFLT   286
```

```
      C     FORMATS                                                           SOLFLT     287
      C                                                                       SOLFLT     288
        100 FORMAT (10X,35HVARIATION IN FREQUENCY FOR MODE NO.,I3)            SOLFLT     289
        140 FORMAT (10X,30HNUMBER OF MODES ELIMINATED ARE, I3                 SOLFLT     290
           1    ,//,10X,28HELIMINATED MODAL INDICES ARE, /,10X,20I4)          SOLFLT     291
        145 FORMAT (10X,35HNUMBER OF MODES ELIMINATED ARE ZERO)               SOLFLT     292
        900 FORMAT (      5HPASS= ,I2, 9H,  MACH =,F5.2, 14H,  DEN RATIO =,F5.2 SOLFLT   293
           1             ,15H,  FREQ RATIO =,F5.2,12X)                        SOLFLT     294
        910 FORMAT (18A4)                                                     SOLFLT     295
        920 FORMAT (10X, 5HPASS= ,I2, 9H,  MACH =,F5.2, 14H,  DEN RATIO =,F5.2 SOLFLT   296
           1             ,15H,  FREQ RATIO =,F5.2,/,10X,60(1H-))              SOLFLT     297
       1010 FORMAT ( 10X, 20HGENERALIZED MASS, LB)                            SOLFLT     298
       1011 FORMAT (10X,1X,4HMODE,2X,5HMODE=,1(  1I3,1X, 3(1H-))              SOLFLT     299
           1                                   ,7(  1I4,1X, 9(1H-)))          SOLFLT     300
       1012 FORMAT ( 10X, I5, 1P8E14.6)                                       SOLFLT     301
       1100 FORMAT (10X, 9HDENSITY =,2X, 1P1E14.6, 11H,  LB/FT**3)            SOLFLT     302
       1500 FORMAT (10X,35HFLUTTER ANALYSIS USING THE K METHOD                SOLFLT     303
           1      ,/10X,35(1H-))                                              SOLFLT     304
       1510 FORMAT (10X,37HFLUTTER ANALYSIS USING THE P-K METHOD              SOLFLT     305
           1      ,/10X,37(1H-))                                              SOLFLT     306
       1610 FORMAT (10X,48                                                    SOLFLT     307
           1   HGENERALIZED MASS, FREQUENCY, AND MODAL STIFFNESS              SOLFLT     308
           2      ,/10X,48(1H-))                                              SOLFLT     309
       2010 FORMAT (10X,1X,4HMODE,2X,9HFREQUENCY,5X,9HFREQUENCY               SOLFLT     310
           1     ,/,10X,5X        ,2X,9HCYC/SEC  ,5X,7HRAD/SEC)               SOLFLT     311
      CIBM                                                                    SOLFLT     312
      C3000 FORMAT (18A4)                                                     SOLFLT     313
      CIBM                                                                    SOLFLT     314
      CCDC                                                                    SOLFLT     315
       3000 FORMAT (7A10,1A2)                                                 SOLFLT     316
      CCDC                                                                    SOLFLT     317
       3010 FORMAT (10X,56HCOMPLEX GENERALIZED MODAL STIFFNESS, (REAL, IMAG), SOLFLT     318
           1LB/IN)                                                            SOLFLT     319
       3011 FORMAT (10X,1X,4HMODE,2X,5HMODE=,1(  1I3,1X,17(1H-))              SOLFLT     320
           1                                   ,3(  1I4,1X,23(1H-)))          SOLFLT     321
       3012 FORMAT (10X,I5,4(2X,1H(,1P1E11.4,1H,1X,1P1E11.4,1H)))             SOLFLT     322
       4010 FORMAT (10X,18                                                    SOLFLT     323
           1   HDENSITY VARIATIONS                                            SOLFLT     324
           2     ,/,10X,18(1H-))                                              SOLFLT     325
       4020 FORMAT (10X,20                                                    SOLFLT     326
           1   HFREQUENCY VARIATIONS                                          SOLFLT     327
           2     ,/,10X,20(1H-))                                              SOLFLT     328
       4030 FORMAT (10X,38                                                    SOLFLT     329
           1   HMODAL ELIMINATION VARIATIONS BASED ON ,35                     SOLFLT     330
           2   HDIRECT SPECIFICATION VIA INPUT DATA                           SOLFLT     331
           3     ,/,10X,73(1H-))                                              SOLFLT     332
      C                                                                       SOLFLT     333
            RETURN                                                            SOLFLT     334
            END                                                               SOLFLT     335
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
208	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
217	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

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CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM
    228     I               AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.


        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  SOLFLT          1          333

 VARIABLES      SN  TYPE            RELOCATION
     0  B           COMPLEX    ARRAY  MODD        REFS      22      60     165
     0  BB          COMPLEX    ARRAY  FLEXT       REFS      13      26      60     181     186     232
                                               DEFINED     165     181     186
     1  BETA        REAL              FLUTAN      REFS      23
    50  BR          REAL              COMA        REFS      21
    15  D           REAL              KLUES       REFS      39
    27  DBAL        REAL              KLUES       REFS      39
    16  DEL         REAL              KLUES       REFS      39
  6200  DETAD       COMPLEX    ARRAY  MODD        REFS      22      60
    12  DWMAX       REAL              KLUES       REFS      39
    11  EPS1        REAL              KLUES       REFS      39
    17  EPS2        REAL              KLUES       REFS      39
     3  FHI         REAL              FLUTV       REFS      25
     2  FLO         REAL              FLUTV       REFS      25
     0  FMACH       REAL              FLUTAN      REFS      23      94     103     273     279
  1325  I           INTEGER                       REFS      70      71   2*163   2*165     180   4*181     261
                                               DEFINED      69     162     179     261
    22  IBAND       INTEGER           KLUES       REFS      39
     7  IDNOPT      INTEGER           KLUES       REFS      39
     4  IE          INTEGER           FLUTV       REFS      25     255  DEFINED     252
    21  IFA         INTEGER           PLACES      REFS      42
    67  IFADD       INTEGER           PLACES      REFS      42
    41  IFADDI      INTEGER           PLACES      REFS      42
    33  IFB         INTEGER           PLACES      REFS      42
    71  IFBAL       INTEGER           PLACES      REFS      42
    43  IFBALI      INTEGER           PLACES      REFS      42
   117  IFBR        INTEGER           PLACES      REFS      42
    53  IFBT        INTEGER           PLACES      REFS      42
    73  IFDESF      INTEGER           PLACES      REFS      42
    45  IFDESI      INTEGER           PLACES      REFS      42
    55  IFDESN      INTEGER           PLACES      REFS      42
    35  IFDESO      INTEGER           PLACES      REFS      42
    77  IFDUM1      INTEGER           PLACES      REFS      42
   101  IFDUM2      INTEGER           PLACES      REFS      42
   103  IFDUM3      INTEGER           PLACES      REFS      42
    23  IFIN        INTEGER           KLUES       REFS      39
   141  IFINCK      INTEGER           PLACES      REFS      42
   137  IFINCM      INTEGER           PLACES      REFS      42
    31  IFKS        INTEGER           PLACES      REFS      42
   105  IFL         INTEGER           PLACES      REFS      42
   115  IFLR        INTEGER           PLACES      REFS      42
    57  IFMD        INTEGER           PLACES      REFS      42
    65  IFMDB       INTEGER           PLACES      REFS      42
    37  IFMDBI      INTEGER           PLACES      REFS      42
    61  IFMEMF      INTEGER           PLACES      REFS      42
```

```
VARIABLES       SN  TYPE              RELOCATION
     25  IFMEMN     INTEGER               PLACES        REFS        42
     51  IFMEMO     INTEGER               PLACES        REFS        42
    125  IFMODK     INTEGER               PLACES        REFS        42
    123  IFMODM     INTEGER               PLACES        REFS        42
    135  IFPH       INTEGER               PLACES        REFS        42
    127  IFPHT      INTEGER               PLACES        REFS        42
    121  IFPHTF     INTEGER               PLACES        REFS        42
    133  IFQ        INTEGER               PLACES        REFS        42
    131  IFQT       INTEGER               PLACES        REFS        42
     11  IFSCR      INTEGER               PLACES        REFS        42
     27  IFSTFN     INTEGER               PLACES        REFS        42
     63  IFSTFO     INTEGER               PLACES        REFS        42
     12  IFS1       INTEGER               PLACES        REFS        42
     13  IFS2       INTEGER               PLACES        REFS        42
     14  IFS3       INTEGER               PLACES        REFS        42
     15  IFS4       INTEGER               PLACES        REFS        42
     75  IFWT       INTEGER               PLACES        REFS        42
     47  IFWTI      INTEGER               PLACES        REFS        42
     23  IFY        INTEGER               PLACES        REFS        42
    107  IFYT       INTEGER               PLACES        REFS        42
    111  IFZ        INTEGER               PLACES        REFS        42
    113  IFZR       INTEGER               PLACES        REFS        42
   1352  IMODV      INTEGER                             REFS       252      254     DEFINED     240
   1347  INMD       INTEGER                             REFS       174    2*175       177       180       185      4*186
                                                     DEFINED       173
      3  IR         INTEGER               CHEAD         REFS        32    2*212     2*220     3*221     2*232
      2  IRED       INTEGER               KLUES         REFS        39
   1341  IRHOV      INTEGER                             REFS        92      276     DEFINED      91
      0  ISAVFO     INTEGER                F.P.         REFS       273      279     DEFINED       1
   1343  ISTIV      INTEGER                             REFS       103      167       175       181     2*186       276
                                                     DEFINED       101
   1337  ITAPE    * INTEGER                          DEFINED        82
      2  ITAPEP     INTEGER               COMRWP        REFS        36
      0  ITAPER     INTEGER               COMRWP        REFS        36
      0  ITAPES     INTEGER      ARRAY    CTAPES        REFS        14       28        75        80        81        82
      7  ITAPET     INTEGER               CTABLE        REFS        37
      1  ITAPEW     INTEGER               COMRWP        REFS        36      116       118       123       125       137       139
                                                         142       151      153       171       195       197       210       219
                                                         230       243      245       262       269    I/O REFS     117       124
                                                         138       141      152       170       196       209       211       212
                                                         218       221      229       231       232       244       261       268
   1330  ITAP18     INTEGER                          DEFINED        75   I/O REFS     102       103       104       105       106
                                                         107
   1354  ITC        INTEGER                             REFS     2*258  DEFINED       257
   1353  ITRA       INTEGER                             REFS       256      258     DEFINED     255
     20  IUA        INTEGER               PLACES        REFS        42
     66  IUADD      INTEGER               PLACES        REFS        42
     40  IUADDI     INTEGER               PLACES        REFS        42
     32  IUB        INTEGER               PLACES        REFS        42
     70  IUBAL      INTEGER               PLACES        REFS        42
     42  IUBALI     INTEGER               PLACES        REFS        42
    116  IUBR       INTEGER               PLACES        REFS        42
     52  IUBT       INTEGER               PLACES        REFS        42
     16  IUCD       INTEGER               PLACES        REFS        42
     72  IUDESF     INTEGER               PLACES        REFS        42
     44  IUDESI     INTEGER               PLACES        REFS        42
     54  IUDESN     INTEGER               PLACES        REFS        42
```

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VARIABLES      SN  TYPE           RELOCATION
    34  IUDESO     INTEGER            PLACES       REFS         42
    76  IUDUM1     INTEGER            PLACES       REFS         42
   100  IUDUM2     INTEGER            PLACES       REFS         42
   102  IUDUM3     INTEGER            PLACES       REFS         42
     4  IUGO1      INTEGER            PLACES       REFS         42
     5  IUGO2      INTEGER            PLACES       REFS         42
     6  IUGO3      INTEGER            PLACES       REFS         42
     7  IUGO4      INTEGER            PLACES       REFS         42
   140  IUINCK     INTEGER            PLACES       REFS         42
   136  IUINCM     INTEGER            PLACES       REFS         42
     0  IUIN1      INTEGER            PLACES       REFS         42
     1  IUIN2      INTEGER            PLACES       REFS         42
    30  IUKS       INTEGER            PLACES       REFS         42
   104  IUL        INTEGER            PLACES       REFS         42
   114  IULR       INTEGER            PLACES       REFS         42
    56  IUMD       INTEGER            PLACES       REFS         42
    64  IUMDB      INTEGER            PLACES       REFS         42
    36  IUMDBI     INTEGER            PLACES       REFS         42
    60  IUMEMF     INTEGER            PLACES       REFS         42
    24  IUMEMN     INTEGER            PLACES       REFS         42
    50  IUMEMO     INTEGER            PLACES       REFS         42
   124  IUMODK     INTEGER            PLACES       REFS         42
   122  IUMODM     INTEGER            PLACES       REFS         42
     2  IUOUT1     INTEGER            PLACES       REFS         42
     3  IUOUT2     INTEGER            PLACES       REFS         42
   134  IUPH       INTEGER            PLACES       REFS         42
   126  IUPHT      INTEGER            PLACES       REFS         42
   120  IUPHTF     INTEGER            PLACES       REFS         42
    17  IUPR       INTEGER            PLACES       REFS         42
   132  IUQ        INTEGER            PLACES       REFS         42
   130  IUQT       INTEGER            PLACES       REFS         42
    10  IUSCR      INTEGER            PLACES       REFS         42
    26  IUSTFN     INTEGER            PLACES       REFS         42
    62  IUSTFO     INTEGER            PLACES       REFS         42
    74  IUWT       INTEGER            PLACES       REFS         42
    46  IUWTI      INTEGER            PLACES       REFS         42
    22  IUY        INTEGER            PLACES       REFS         42
   106  IUYT       INTEGER            PLACES       REFS         42
   110  IUZ        INTEGER            PLACES       REFS         42
   112  IUZR       INTEGER            PLACES       REFS         42
  1326  I1         INTEGER                         REFS         71   DEFINED        70
  1345  J          INTEGER                         REFS      2*165   DEFINED       164
  1350  JC         INTEGER                         REFS        211       212       231       232   DEFINED       211       212
                                                    231        232
     4  JCL        INTEGER            CHEAD        REFS         32       211       212       231       232
     5  JCU        INTEGER            CHEAD        REFS         32       211       212       231       232
     7  KBPAGE     INTEGER            CLIST        REFS         29
  1340  KFIRST     INTEGER                         REFS        110       273   DEFINED        83       111
     0  KHEAD      INTEGER            CHEAD        REFS         32       208       217       228
     4  KLABEL     INTEGER            CLIST        REFS         29
    24  KLUB       INTEGER            KLUES        REFS         39
     4  KLUBAL     INTEGER            KLUES        REFS         39
     3  KLUMD      INTEGER            KLUES        REFS         39
     1  KLUNAL     INTEGER            KLUES        REFS         39
    25  KLUQ       INTEGER            KLUES        REFS         39
     0  KLUSE      INTEGER            KLUES        REFS         39
     2  KOLUMN     INTEGER            CHEAD        REFS         32       224       225   DEFINED        72        73       225
```

```
VARIABLES      SN   TYPE            RELOCATION
                                                 234
    0  KOUNT      INTEGER              CLIST     REFS        29       119       126       130       140       143       149
                                                  154       168       172       193       198       241       246       259
                                                  263       266       270   DEFINED       108       119       126       130
                                                  140       143       149       154       168       172       193       198
                                                  241       246       259       263       266       270
   11  KOUNTH     INTEGER              CLIST     REFS        29
   12  KOUNTI     INTEGER              CLIST     REFS        29
    1  KPAGE      INTEGER              CLIST     REFS        29
    0  KREPOR     INTEGER              REPORT    REFS        31        73
    1  KRETUR     INTEGER              CHEAD     REFS        32       213       222       233   DEFINED        67       206
 1351  KSAVE      INTEGER                        REFS       234   DEFINED       224
    0  KTABLE     INTEGER              CTABLE    REFS        37   DEFINED       114       134       146       157       201
                                                  249
    5  KTABLO     INTEGER              CTABLE    REFS        37
    0  KTFH       INTEGER              CTFH      REFS        35   DEFINED        90       284
    5  KTPAGE     INTEGER              CLIST     REFS        29
 1344  L          INTEGER                        REFS       105   DEFINED       105
    0  LC         INTEGER    ARRAY     COMA      REFS        21        76        77        78        79        93       115
                                                  122       166       173     3*177       272       277
    2  LINES      INTEGER              CLIST     REFS        29       108     2*130     2*149     2*168     2*193     2*241
                                                2*259     2*266
   10  LINESG     INTEGER              CLIST     REFS        29
    3  LINEST     INTEGER              CLIST     REFS        29
    7  LSKIP      INTEGER              CHEAD     REFS        32   DEFINED        65       204
    6  LSUB       INTEGER              CHEAD     REFS        32   DEFINED        66       205       215       226
    1  LTFH       INTEGER              CTFH      REFS        35       105
    0  LTSHF      INTEGER              CTSHF     REFS        33       207       216       227
 1346  MELIM      INTEGER                        REFS       170   DEFINED       166       167
   26  MORBAL     INTEGER              KLUES     REFS        39
    5  MSADD      INTEGER              KLUES     REFS        39
 1335  MTAP1      INTEGER                     DEFINED        80  I/O REFS        94
 1336  MTAP2      INTEGER                     DEFINED        81  I/O REFS       253       278
 1365  NAME1      INTEGER   *UNDEF               REFS        16
 1367  NAME2      INTEGER   *UNDEF               REFS        16
   13  NBAR       INTEGER              KLUES     REFS        39
17550  NC         INTEGER              MODD      REFS        22
    3  NCOLS      INTEGER              CTABLE    REFS        37   DEFINED       113       133       145       156       199
                                                  248
    4  NCOLST     INTEGER              CTABLE    REFS        37
   20  NCYC       INTEGER              KLUES     REFS        39
   14  NFIX       INTEGER              KLUES     REFS        39
    1  NIND       INTEGER    ARRAY     FITR      REFS        13        27       261   DEFINED       258
   43  NINZ       INTEGER    ARRAY     FLUTC     REFS        24       258
 1331  NMODES     INTEGER                        REFS       162       164       179     2*207       216     2*227
                                              DEFINED        76
 1333  NMODV      INTEGER                        REFS       240   DEFINED        78
   21  NNN        INTEGER              KLUES     REFS        39
    0  NO         INTEGER              CONSTS    REFS        34       110       111       284
    0  NOMI       INTEGER              FITR      REFS        27       257     2*261   DEFINED       256
   12  NOTI       INTEGER    ARRAY     FLUTC     REFS        24       256
    6  NPAGE      INTEGER              CLIST     REFS        29
    6  NPAGEA     INTEGER              CTABLE    REFS        37
    6  NPAS       INTEGER              KLUES     REFS        39
    1  NPASS      INTEGER              CTABLE    REFS        37       103
    5  NQZ        INTEGER              FLUTV     REFS        25
 1332  NRHOV      INTEGER                        REFS        91   DEFINED        77
```

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VARIABLES      SN  TYPE            RELOCATION
     2  NROWS      INTEGER              CTABLE      REFS          37  DEFINED     112      132      144      155      200
                                                      247
    57  NRVBO      INTEGER              FLUTAN      REFS          23
  1334  NSTIV      INTEGER                          REFS         101  DEFINED      79
     6  NVTOT      INTEGER              FLUTV       REFS          25
 17500  OMG        REAL        ARRAY    MODD        REFS          22      163     175
  6200  OMGA       REAL        ARRAY    FLEXT       REFS          13       26     220      221  DEFINED      163      175
  1416  OMGC       REAL        ARRAY                REFS          18      221 DEFINED      220
  2013  RATOM      REAL        ARRAY    FLUTC       REFS          24       71
  6250  RHO        REAL                 FLEXT       REFS          26      141 DEFINED       96
  1342  RHOP       REAL                             REFS          94       96     103      273      276      279
                                                 DEFINED          92
     0  RHOR       REAL        ARRAY    FLUTC       REFS          24       92
    40  RVBO       REAL        ARRAY    FLUTAN      REFS          15       23
  1371  SRATIO     REAL        ARRAY                REFS          17      103     175      181    2*186      273
                                                 DEFINED          68       71
     2  TFH        REAL        ARRAY    CTFH        REFS          19       35 DEFINED      105
  1355  TITLE      REAL        ARRAY                REFS          11      135 DEFINED      107
     1  TSHF       REAL        ARRAY    CTSHF       REFS          17       33     207      216      227
  1327  TWOPI      REAL                             REFS         220  DEFINED      74
  6251  VB         REAL                 FLEXT       REFS          26
     2  VBO        REAL        ARRAY    FLUTAN      REFS          15       23
    10  VDFS       REAL                 KLUES       REFS          39
     1  VH         REAL                 FLUTV       REFS          25
     0  VL         REAL                 FLUTV       REFS          25
 14400  WW         REAL        ARRAY    MODD        REFS          22      212
     1  YES        INTEGER              CONSTS      REFS           5       34      73       83       90
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
        EIGM                  3             276
        FLOP                  5             273
        HEAD                  4             207      216      227
        PLB                   3             116      118      123      125     137      139      142      151      153
                                            171      195      197      210     219      230      243      245      262
                                            269
        PROGNA                2              64
        PRPLT                 3             279
        PTABLE                3             120      127      135      147     158      202      250
        TITLES                1             109      131      136      150     169      194      242      260      267

STATEMENT LABELS             DEF LINE   REFERENCES
     0  3                       165        162      164
     0  4            INACTIVE   239
   303  5                       184        177
   300  6                       182        179      180
   310  7                       187        183      185
   261  8                       176        174
   622  10                      280        277
   571  11                      265        254
     0  12                      258        257
   611  13                      275        272
   615  20                      278        274
    56  25                       95         93
   604  40                      271        264
     0  50                       71         69
   126  60                      122        115
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  140  70                       128        121       122
  140  80                       129        110
 1100  100    FMT               288        170
    0  105                      281        240
 1106  140    FMT               289        261
 1120  145    FMT               291        268
    0  200                      282        101
  334  215                      207        213
  346  216                      209        208
  350  217                      210        208
  363  218                      212        208
  404  235                      216        222
  416  236                      218        217
  420  237                      219        217
  422  238                      220        217
    0  300                      283         91
  437  315                      227        233
  451  316                      229        228
  453  317                      230        228
  466  318                      232        228
 1126  900    FMT               292        103
 1137  910    FMT               294        105
 1141  920    FMT  NO REFS      295
 1153  1010   FMT               297        209
 1157  1011   FMT               298        211
 1166  1012   FMT               300        212       221
 1171  1100   FMT               301        141
 1177  1500   FMT               302        117
 1206  1510   FMT               304        124
 1215  1610   FMT               306        196
 1225  2010   FMT               309        218
 1235  3000   FMT               315        107
 1237  3010   FMT               317        229
 1247  3011   FMT               319        231
 1256  3012   FMT               321        232
 1264  4010   FMT               322        138
 1271  4020   FMT               325        152
 1276  4030   FMT               328        244

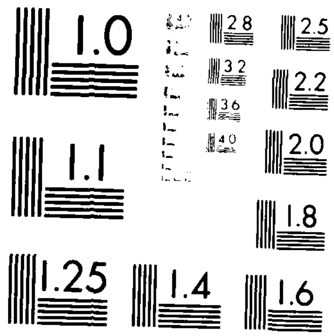
LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   17  50       I          69  71       4B      INSTACK
   51  300      IRHOV      91 283     561B               EXT REFS  NOT INNER
   61  200      ISTIV     101 282     546B               EXT REFS  NOT INNER
  216  3        I         162 165      21B               NOT INNER
  230  3        J         164 165       3B      INSTACK
  274  6        I         179 182       6B      INSTACK
  356           JC        211 211       4B               EXT REFS
  367           JC        212 212      11B               EXT REFS
  461           JC        231 231       4B               EXT REFS
  472           JC        232 232      11B               EXT REFS
  511  105      IMODV     240 281     114B               EXT REFS  NOT INNER
  547  12       ITC       257 258       3B      INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       COMA         41              0 LC      (40)           40 BR     (1)
       MODD       8041              0 B       (3200)       3200 DETAD  (3200)        6400 WW      (1600)
                                 8000 OMG     (40)         8040 NC     (1)
```

```
COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       FLUTAN      48           0 FMACH  (1)             1 BETA   (1)             2 VBO    (30)
                               32 RVBO   (15)           47 NRVBO  (1)
       FLUTC     1055           0 RHOR   (10)           10 NOTI   (25)           35 NINZ   (1000)
                             1035 RATOM  (20)
       FLUTV        7           0 VL     (1)             1 VH     (1)             2 FLO    (1)
                                3 FHI    (1)             4 IE     (1)             5 NQZ    (1)
                                6 NVTOT  (1)
       FLEXT     3242           0 BB     (3200)       3200 OMGA   (40)         3240 RHO    (1)
                             3241 VB     (1)
       FITR        41           0 NOMI   (1)             1 NIND   (40)
       CTAPES      50           0 ITAPES (50)
       CLIST       11           0 KOUNT  (1)             1 KPAGE  (1)             2 LINES  (1)
                                3 LINEST (1)             4 KLABEL (1)             5 KTPAGE (1)
                                6 NPAGE  (1)             7 KBPAGE (1)             8 LINESG (1)
                                9 KOUNTH (1)            10 KOUNTI (1)
       REPORT       1           0 KREPOR (1)
       CHEAD        8           0 KHEAD  (1)             1 KRETUR (1)             2 KOLUMN (1)
                                3 IR     (1)             4 JCL    (1)             5 JCU    (1)
                                6 LSUB   (1)             7 LSKIP  (1)
       CTSHF        2           0 LTSHF  (1)             1 TSHF   (1)
       CONSTS       2           0 NO     (1)             1 YES    (1)
       CTFH         3           0 KTFH   (1)             1 LTFH   (1)             2 TFH    (1)
       COMRWP       3           0 ITAPER (1)             1 ITAPEW (1)             2 ITAPEP (1)
       CTABLE       8           0 KTABLE (1)             1 NPASS  (1)             2 NROWS  (1)
                                3 NCOLS  (1)             4 NCOLST (1)             5 KTABLO (1)
                                6 NPAGEA (1)             7 ITAPET (1)
       KLUES       24           0 KLUSE  (1)             1 KLUNAL (1)             2 IRED   (1)
                                3 KLUMD  (1)             4 KLUBAL (1)             5 MSADD  (1)
                                6 NPAS   (1)             7 IDNOPT (1)             8 VDES   (1)
                                9 EPS1   (1)            10 DWMAX  (1)            11 NBAR   (1)
                               12 NFIX   (1)            13 D      (1)            14 DEL    (1)
                               15 EPS2   (1)            16 NCYC   (1)            17 NNN    (1)
                               18 IBAND  (1)            19 IFIN   (1)            20 KLUB   (1)
                               21 KLUQ   (1)            22 MORBAL (1)            23 DBAL   (1)
       PLACES      98           0 IUIN1  (1)             1 IUIN2  (1)             2 IUOUT1 (1)
                                3 IUOUT2 (1)             4 IUGO1  (1)             5 IUGO2  (1)
                                6 IUGO3  (1)             7 IUGO4  (1)             8 IUSCR  (1)
                                9 IFSCR  (1)            10 IFS1   (1)            11 IFS2   (1)
                               12 IFS3   (1)            13 IFS4   (1)            14 IUCD   (1)
                               15 IUPR   (1)            16 IUA    (1)            17 IFA    (1)
                               18 IUY    (1)            19 IFY    (1)            20 IUMEMN (1)
                               21 IFMEMN (1)            22 IUSTFN (1)            23 IFSTFN (1)
                               24 IUKS   (1)            25 IFKS   (1)            26 IUB    (1)
                               27 IFB    (1)            28 IUDESO (1)            29 IFDESO (1)
                               30 IUMDBI (1)            31 IFMDBI (1)            32 IUADDI (1)
                               33 IFADDI (1)            34 IUBALI (1)            35 IFBALI (1)
                               36 IUDESI (1)            37 IFDESI (1)            38 IUWTI  (1)
                               39 IFWTI  (1)            40 IUMEMO (1)            41 IFMEMO (1)
                               42 IUBT   (1)            43 IFBT   (1)            44 IUDESN (1)
                               45 IFDESN (1)            46 IUMD   (1)            47 IFMD   (1)
                               48 IUMEMF (1)            49 IFMEMF (1)            50 IUSTFO (1)
                               51 IFSTFO (1)            52 IUMDB  (1)            53 IFMDB  (1)
                               54 IUADD  (1)            55 IFADD  (1)            56 IUBAL  (1)
                               57 IFBAL  (1)            58 IUDESF (1)            59 IFDESF (1)
                               60 IUWT   (1)            61 IFWT   (1)            62 IUDUM1 (1)
                               63 IFDUM1 (1)            64 IUDUM2 (1)            65 IFDUM2 (1)
                               66 IUDUM3 (1)            67 IFDUM3 (1)            68 IUL    (1)
```

AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2 3/

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART

```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
                                       69 IFL     (1)              70 IUYT    (1)              71 IFYT    (1)
                                       72 IUZ     (1)              73 IFZ     (1)              74 IUZR    (1)
                                       75 IFZR    (1)              76 IULR    (1)              77 IFLR    (1)
                                       78 IUBR    (1)              79 IFBR    (1)              80 IUPHTF  (1)
                                       81 IFPHTF  (1)              82 IUMODM  (1)              83 IFMODM  (1)
                                       84 IUMODK  (1)              85 IFMODK  (1)              86 IUPHT   (1)
                                       87 IFPHT   (1)              88 IUQT    (1)              89 IFQT    (1)
                                       90 IUQ     (1)              91 IFQ     (1)              92 IUPH    (1)
                                       93 IFPH    (1)              94 IUINCM  (1)              95 IFINCM  (1)
                                       96 IUINCK  (1)              97 IFINCK  (1)

STATISTICS
  PROGRAM LENGTH              1527B      855
  CM LABELED COMMON LENGTH   30615B    12685
          52000B CM USED
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```
      SUBROUTINE QFLIN (ITAPE,ARG,QRS,RHO,IFLUT,MID)                    QFLIN   2
C                                                                       QFLIN   3
C     INTERPOLATION ROUTINE FOR P-K PROGRAM                             QFLIN   4
C                                                                       QFLIN   5
      INTEGER YES                                                       QFLIN   6
C                                                                       QFLIN   7
      DIMENSION QR(2,2), Q(15,2), X(15)                                 QFLIN   8
      DIMENSION QK(15,2), XK(15)                                        QFLIN   9
      DIMENSION           LC(40)                                        QFLIN  10
C                                                                       QFLIN  11
      COMPLEX       QRS(MID,1)                                          QFLIN  12
C                                                                       QFLIN  13
      COMMON /KZERO / KZ, XK                                            QFLIN  14
      COMMON /COMA  / LC, BR                                            QFLIN  15
      COMMON /CONSTS/ NO     ,YES                                       QFLIN  16
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              QFLIN  17
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   QFLIN  18
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       QFLIN  19
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA  QFLIN  20
     1               ,ITAPET                                            QFLIN  21
      COMMON /REPORT/ KREPOR                                            QFLIN  22
      COMMON /CHEAD / KHEAD ,KRETUR,KOLUMN,IR,JCL,JCU,LSUB,LSKIP        QFLIN  23
C                                                                       QFLIN  24
      CALL PROGNA (4H(QFL, 4HIN ))                                      QFLIN  25
      LSKIP  =  1                                                       QFLIN  26
      LSUB   =  4                                                       QFLIN  27
      KRETUR =  0                                                       QFLIN  28
      KOLUMN =  8                                                       QFLIN  29
      IF (KREPOR .EQ. YES) KOLUMN = 4                                   QFLIN  30
      REWIND ITAPE                                                      QFLIN  31
      READ (ITAPE) NX, NXMAX, LL, X, NQR                                QFLIN  32
      IF (KZ.EQ.1)  GO TO 105                                           QFLIN  33
      DO 100 I=1,NX                                                     QFLIN  34
      J = NX - I + 1                                                    QFLIN  35
      XK(J) = 1.0 / X(I)                                                QFLIN  36
  100 CONTINUE                                                          QFLIN  37
      KZ = 1                                                            QFLIN  38
  105 CONTINUE                                                          QFLIN  39
      NM        =  LC(2)                                                QFLIN  40
      LLL       =  LL                                                   QFLIN  41
      IF (ARG.LT.X(1) .OR. ARG.GT.X(NX)) LLL = MIN0(3,LL)               QFLIN  42
      KLUE  =  0                                                        QFLIN  43
      IF ( IFLUT .NE. 0 )     KLUE = 1                                  QFLIN  44
      DO 1  K = 1,NQR                                                   QFLIN  45
      DO 3 I=1,2                                                        QFLIN  46
      READ (ITAPE) (Q(K1,I),K1=1,NX)                                    QFLIN  47
      IF (ARG.LT.10.0)  GO TO 3                                         QFLIN  48
      DO 110 K1=1,NX                                                    QFLIN  49
      K2 = NX - K1 + 1                                                  QFLIN  50
      QK(K2,I) = Q(K1,I) * XK(K2) * XK(K2)                              QFLIN  51
  110 CONTINUE                                                          QFLIN  52
    3 CONTINUE                                                          QFLIN  53
      IF (ARG.LT.10.0)  GO TO 115                                       QFLIN  54
      ARGK = 1.0 / ARG                                                  QFLIN  55
      CALL HELGX (ARGK,QR,XK,QK,NX,2,LLL,2,NXMAX,0,KLUE)                QFLIN  56
      GO TO 120                                                         QFLIN  57
  115 CONTINUE                                                          QFLIN  58
```

```
      CALL HELGX (ARG,QR,X,Q,NX,2,LLL,2,NXMAX,0,KLUE)                   QFLIN      59
  120 CONTINUE                                                          QFLIN      60
      I   =  (K-1) / NM + 1                                             QFLIN      61
      J   =  K - (I-1) * NM                                             QFLIN      62
      QRS(I,J) = CMPLX (QR(1,1),QR(2,1))                                QFLIN      63
      IF (ARG.LT.10.0)  GO TO 1                                         QFLIN      64
      QRS(I,J) = QRS(I,J) * ARG * ARG                                   QFLIN      65
    1 CONTINUE                                                          QFLIN      66
      IF (IFLUT .EQ. 0) GO TO 1000                                      QFLIN      67
      IF ( IFLUT .EQ. 2 )     GO TO 7                                   QFLIN      68
C                                                                       QFLIN      69
C GENERALIZED AIR FORCES AND ASSOCIATED RESULTS                         QFLIN      70
C                                                                       QFLIN      71
      DO 5 I=1,NM                                                       QFLIN      72
      DO 5 J=1,NM                                                       QFLIN      73
    5 QRS(I,J) =  RHO * QRS(I,J)                                        QFLIN      74
      KOUNT  =  LINES                                                   QFLIN      75
      CALL TITLES (2)                                                   QFLIN      76
      CALL PLB (1,1,ITAPEW)                                             QFLIN      77
      WRITE (ITAPEW,1630)                                               QFLIN      78
      CALL PLB (1,1,ITAPEW)                                             QFLIN      79
      KOUNT  =  KOUNT + 4                                               QFLIN      80
      NCOLS  =  4                                                       QFLIN      81
      NROWS  =  0                                                       QFLIN      82
      KTABLE =  2                                                       QFLIN      83
      CALL PTABLE (2,30,30                                              QFLIN      84
     1   HGENERALIZED AERODYNAMIC FORCES)                               QFLIN      85
      CALL PLB (1,1,ITAPEW)                                             QFLIN      86
      WRITE (ITAPEW,2) RHO, ARG, NM                                     QFLIN      87
      CALL PLB (1,1,ITAPEW)                                             QFLIN      88
      KOUNT  =  KOUNT +3                                                QFLIN      89
C                                                                       QFLIN      90
      KSAVE  =  KOLUMN                                                  QFLIN      91
      KOLUMN =  KOLUMN/2                                                QFLIN      92
      LSUB   =  4                                                       QFLIN      93
      NMODES =  NM                                                      QFLIN      94
  315 CALL HEAD (LTSHF,TSHF,NMODES,NMODES)                              QFLIN      95
      GO TO (316, 317, 318), KHEAD                                      QFLIN      96
  316 WRITE (ITAPEW,3010)                                               QFLIN      97
  317 CALL PLB (1,1,ITAPEW)                                             QFLIN      98
      WRITE (ITAPEW,3011) (JC, JC=JCL,JCU)                              QFLIN      99
  318 WRITE (ITAPEW,3012)  IR, (QRS(IR,JC), JC=JCL,JCU)                 QFLIN     100
      IF (KRETUR .LT. 3) GO TO 315                                      QFLIN     101
      KOLUMN =  KSAVE                                                   QFLIN     102
      GO TO 1000                                                        QFLIN     103
C                                                                       QFLIN     104
C GRADIENT OF GENERALIZED AIR FORCES                                    QFLIN     105
C                                                                       QFLIN     106
    7 REWIND ITAPE                                                      QFLIN     107
      READ (ITAPE) NX, NXMAX, LL, X, NQR                                QFLIN     108
      DO 8 K=1,NQR                                                      QFLIN     109
      DO 9 I=1,2                                                        QFLIN     110
      READ (ITAPE) (Q(K1,I),K1=1,NX)                                    QFLIN     111
      IF (ARG.LT.10.0)  GO TO 9                                         QFLIN     112
      DO 150 K1=1,NX                                                    QFLIN     113
      K2 = NX - K1 + 1                                                  QFLIN     114
      QK(K2,I) = Q(K1,I) * XK(K2) * XK(K2)                              QFLIN     115
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```
  150 CONTINUE                                                  QFLIN     116
    9 CONTINUE                                                  QFLIN     117
      IF (ARG.LT 10.0)  GO TO 155                               QFLIN     118
      ARGK = 1.0 / ARG                                          QFLIN     119
      CALL HELGX (ARGK,QR,XK,QK,NX,2,LLL,2,NXMAX,0,KLUE)        QFLIN     120
      GO TO 160                                                 QFLIN     121
  155 CONTINUE                                                  QFLIN     122
      CALL HELGX (ARG,QR,X,Q,NX,2,LLL,2,NXMAX,0,KLUE)           QFLIN     123
  160 CONTINUE                                                  QFLIN     124
      I  =  (K-1) / NM + 1                                      QFLIN     125
      J  =  K - (I-1) * NM                                      QFLIN     126
      QRS(I,J) = CMPLX (QR(1,2),QR(2,2))                        QFLIN     127
      IF (ARG.LT.10.0)  GO TO 8                                 QFLIN     128
      QRS(I,J) = QRS(I,J) * ARG * ARG                           QFLIN     129
    8 QRS(I,J)  =  - RHO * ARG * ARG * QRS(I,J)                 QFLIN     130
      KOUNT  =  LINES                                           QFLIN     131
      CALL TITLES (2)                                           QFLIN     132
      CALL PLB (1,1,ITAPEW)                                     QFLIN     133
      WRITE (ITAPEW,1650)                                       QFLIN     134
      CALL PLB (1,1,ITAPEW)                                     QFLIN     135
      KOUNT  =  KOUNT + 4                                       QFLIN     136
      NCOLS  =  4                                               QFLIN     137
      NROWS  =  0                                               QFLIN     138
      KTABLE =  2                                               QFLIN     139
      CALL PTABLE (2,42,42                                      QFLIN     140
     1   HGRADIENT OF GENERALIZED AERODYNAMIC FORCES)           QFLIN     141
      CALL PLB (1,1,ITAPEW)                                     QFLIN     142
      WRITE (ITAPEW,2) RHO, ARG, NM                             QFLIN     143
      CALL PLB (1,1,ITAPEW)                                     QFLIN     144
      KOUNT  =  KOUNT +3                                        QFLIN     145
C                                                               QFLIN     146
      KSAVE  =  KOLUMN                                          QFLIN     147
      KOLUMN =  KOLUMN/2                                        QFLIN     148
      LSUB   =  4                                               QFLIN     149
      NMODES =  NM                                              QFLIN     150
  415 CALL HEAD (LTSHF,TSHF,NMODES,NMODES)                      QFLIN     151
      GO TO (416, 417, 418), KHEAD                              QFLIN     152
  416 WRITE (ITAPEW,3010)                                       QFLIN     153
  417 CALL PLB (1,1,ITAPEW)                                     QFLIN     154
      WRITE (ITAPEW,3011) (JC, JC=JCL,JCU)                      QFLIN     155
  418 WRITE (ITAPEW,3012)  IR, (QRS(IR,JC), JC=JCL,JCU)         QFLIN     156
      IF (KRETUR .LT. 3) GO TO 415                              QFLIN     157
      KOLUMN =  KSAVE                                           QFLIN     158
 1000 CONTINUE                                                  QFLIN     159
C                                                               QFLIN     160
C FORMATS                                                       QFLIN     161
C                                                               QFLIN     162
    2 FORMAT (10X,4HRHO=,1P1E14.7,2X,10HLBS/CU.FT.,             QFLIN     163
     1         3X,4HVBO=,1P1E14.7,3X,4HFOR ,I2,3X, 5HMODES)     QFLIN     164
 1630 FORMAT (10X,30                                            QFLIN     165
     1   HGENERALIZED AERODYNAMIC FORCES                        QFLIN     166
     2       ,/10X,30(1H-))                                     QFLIN     167
 1650 FORMAT (10X,42                                            QFLIN     168
     1   HGRADIENT OF GENERALIZED AERODYNAMIC FORCES            QFLIN     169
     2       ,/10X,42(1H-))                                     QFLIN     170
 3010 FORMAT (10X,24H(REAL, IMAGINARY)        )                 QFLIN     171
 3011 FORMAT (10X,1X,4HMODE,2X,5HMODE=,1(  1I3,1X,17(1H-))      QFLIN     172
```

```
                 1                                   ,3(   1I4,1X,23(1H-)))             QFLIN     173
           3012 FORMAT (10X,I5,4(2X,1H(,1P1E11.4,1H,1X,1P1E11.4,1H)))                   QFLIN     174
          C                                                                             QFLIN     175
  175               RETURN                                                              QFLIN     176
                    END                                                                 QFLIN     177


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    95      I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
   151      I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.


       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  QFLIN           1         175

VARIABLES      SN  TYPE               RELOCATION
    0  ARG         REAL                  F.P.      REFS       2*41       47       53       54       58      63     2*64
                                                     86        111      117      118      122      127   2*128    2*129
                                                    142    DEFINED        1
  770  ARGK        REAL                            REFS         55      119  DEFINED       54      118
   50  BR          REAL                 COMA       REFS         14
  760  I           INTEGER                         REFS         34       35       46     2*50       61      62     2*64
                                                   2*73        110    2*114      125      126    2*128   2*129
                                                DEFINED         33       45       60       71      109     124
    0  IFLUT       INTEGER               F.P.      REFS         43       66       67  DEFINED        1
    3  IR          INTEGER              CHEAD      REFS         22     2*99    2*155
    0  ITAPE       INTEGER               F.P.   DEFINED          1  I/O REFS       30       31       46     106      107
                                                    110
    2  ITAPEP      INTEGER             COMRWP      REFS         16
    0  ITAPER      INTEGER             COMRWP      REFS         16
    7  ITAPET      INTEGER             CTABLE      REFS         19
    1  ITAPEW      INTEGER             COMRWP      REFS         16       76       78       85       87      97      132
                                                    134        141      143      153 I/O REFS       77      86       96
                                                     98         99      133      142      152      154     155
  761  J           INTEGER                         REFS         35       62     2*64     2*73      126   2*128    2*129
                                                DEFINED         34       61       72      125
  775  JC          INTEGER                         REFS         98       99      154      155  DEFINED      98       99
                                                    154        155
    4  JCL         INTEGER              CHEAD      REFS         22       98       99      154      155
    5  JCU         INTEGER              CHEAD      REFS         22       98       99      154      155
  765  K           INTEGER                         REFS         60       61      124      125  DEFINED      44      108
    7  KBPAGE      INTEGER              CLIST      REFS         17
    0  KHEAD       INTEGER              CHEAD      REFS         22       95      151
    4  KLABEL      INTEGER              CLIST      REFS         17
  764  KLUE        INTEGER                         REFS         55       58      119      122  DEFINED      42       43
    2  KOLUMN      INTEGER              CHEAD      REFS         22       90       91      146      147
                                                DEFINED         28       29       91      101      147     157
    0  KOUNT       INTEGER              CLIST      REFS         17       79       88      135      144
                                                DEFINED         74       79       88      130      135     144
```

```
VARIABLES      SN  TYPE            RELOCATION
    11  KOUNTH     INTEGER              CLIST        REFS       17
    12  KOUNTI     INTEGER              CLIST        REFS       17
     1  KPAGE      INTEGER              CLIST        REFS       17
     0  KREPOR     INTEGER              REPORT       REFS       21        29
     1  KRETUR     INTEGER              CHEAD        REFS       22       100       156   DEFINED        27
   771  KSAVE      INTEGER                           REFS      101       157   DEFINED        90       146
     0  KTABLE     INTEGER              CTABLE       REFS       19   DEFINED        82       138
     5  KTABLO     INTEGER              CTABLE       REFS       19
     5  KTPAGE     INTEGER              CLIST        REFS       17
     0  KZ         INTEGER              KZERO        REFS       13        32   DEFINED        37
   766  K1         INTEGER                           REFS       46        49        50       110       113       114
                                                  DEFINED       46        48       110       112
   767  K2         INTEGER                           REFS     3*50     3*114   DEFINED        49       113
     0  LC         INTEGER     ARRAY    COMA         REFS        9        14        39
     2  LINES      INTEGER              CLIST        REFS       17        74       130
    10  LINESG     INTEGER              CLIST        REFS       17
     3  LINEST     INTEGER              CLIST        REFS       17
   756  LL         INTEGER                           REFS       40        41   DEFINED        31       107
   763  LLL        INTEGER                           REFS       55        58       119       122   DEFINED        40        41
     7  LSKIP      INTEGER              CHEAD        REFS       22   DEFINED        25
     6  LSUB       INTEGER              CHEAD        REFS       22   DEFINED        26        92       148
   773  LTSHF      INTEGER                           REFS       94       150
     0  MID        INTEGER               F.P.        REFS       11   DEFINED         1
     3  NCOLS      INTEGER              CTABLE       REFS       19   DEFINED        80       136
     4  NCOLST     INTEGER              CTABLE       REFS       19
   762  NM         INTEGER                           REFS       60        61        71        72        86        93       124
                                                       125     142       149   DEFINED        39
   772  NMODES     INTEGER                           REFS     2*94     2*150   DEFINED        93       149
     0  NO         INTEGER              CONSTS       REFS       15
     6  NPAGE      INTEGER              CLIST        REFS       17
     6  NPAGEA     INTEGER              CTABLE       REFS       19
     1  NPASS      INTEGER              CTABLE       REFS       19
   757  NQR        INTEGER                           REFS       44       108   DEFINED        31       107
     2  NROWS      INTEGER              CTABLE       REFS       19   DEFINED        81       137
   754  NX         INTEGER                           REFS       33        34        41        46        48        49        55
                                                        58     110       112       113       119       122
                                                  DEFINED       31       107
   755  NXMAX      INTEGER                           REFS       55        58       119       122   DEFINED        31       107
  1002  Q          REAL        ARRAY                 REFS        7        50        58       114       122
                                                  DEFINED       46       110
  1057  QK         REAL        ARRAY                 REFS        8        55       119   DEFINED        50       114
   776  QR         REAL        ARRAY                 REFS        7        55        58      2*62       119       122     2*126
     0  QRS        COMPLEX     ARRAY     F.P.        REFS       11        64        73        99       128       129       155
                                                  DEFINED        1        62        64        73       126       128       129
     0  RHO        REAL                  F.P.        REFS       73        86       129       142   DEFINED         1
   774  TSHF       REAL                              REFS       94       150
  1040  X          REAL        ARRAY                 REFS        7        35      2*41        58       122
                                                  DEFINED       31       107
     1  XK         REAL        ARRAY    KZERO        REFS        8        13      2*50        55     2*114       119
                                                  DEFINED       35
     1  YES        INTEGER              CONSTS       REFS        5        15        29
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS       REFERENCES
        HEAD                 4              94       150
        HELGX               11              55        58       119       122
        PLB                  3              76        78        85        87        97       132       134       141       143
```

```
EXTERNALS          TYPE    ARGS        REFERENCES
                                          153
      PROGNA                 2             24
      PTABLE                 3             83        139
      TITLES                 1             75        131

INLINE FUNCTIONS    TYPE   ARGS        DEF LINE  REFERENCES
      CMPLX       COMPLEX    2  INTRIN                62        126
      MINO        INTEGER    0  INTRIN                41

STATEMENT LABELS               DEF LINE    REFERENCES
  141  1                          65          44        63
  674  2        FMT              162          86       142
  106  3                          52          45        47
    0  5                          73          71        72
  271  7                         106          67
  362  8                         129         108       127
  327  9                         116         109       111
    0  100                        36          33
   40  105                        38          32
    0  110                        51          48
  117  115                        57          53
  122  120                        59          56
    0  150                       115         112
  340  155                       121         117
  343  160                       123         120
  220  315                        94         100
  232  316                        96          95
  234  317                        97          95
  247  318                        99          95
  427  415                       150         156
  441  416                       152         151
  443  417                       153         151
  456  418                       155         151
  500  1000                      158          66       102
  705  1630     FMT              164          77
  713  1650     FMT              167         133
  723  3010     FMT              170          96       152
  730  3011     FMT              171          98       154
  737  3012     FMT              173          99       155

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   31  100      I           33  36        5B      INSTACK
   55  1        K           44  65       67B               EXT REFS  NOT INNER
   56  3        I           45  52       33B               EXT REFS  NOT INNER
  101  110      K1          48  51        4B      INSTACK
  150  5        I           71  73       15B               NOT INNER
  156  5        J           72  73        3B      INSTACK
  242           JC          98  98        4B               EXT REFS
  253           JC          99  99       11B               EXT REFS
  276  8        K          108 129       76B               EXT REFS  NOT INNER
  277  9        I          109 116       33B               EXT REFS  NOT INNER
  322  150      K1         112 115        4B      INSTACK
  451           JC         154 154        4B               EXT REFS
  462           JC         155 155       11B               EXT REFS
```

```
COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       KZERO         16                0 KZ      (1)              1 XK      (15)
       COMA          41                0 LC      (40)            40 BR      (1)
       CONSTS         2                0 NO      (1)              1 YES     (1)
       COMRWP         3                0 ITAPER  (1)              1 ITAPEW  (1)            2 ITAPEP (1)
       CLIST         11                0 KOUNT   (1)              1 KPAGE   (1)            2 LINES  (1)
                                       3 LINEST  (1)              4 KLABEL  (1)            5 KTPAGE (1)
                                       6 NPAGE   (1)              7 KBPAGE  (1)            8 LINESG (1)
                                       9 KOUNTH  (1)             10 KOUNTI  (1)
       CTABLE         8                0 KTABLE  (1)              1 NPASS   (1)            2 NROWS  (1)
                                       3 NCOLS   (1)              4 NCOLST  (1)            5 KTABLO (1)
                                       6 NPAGEA  (1)              7 ITAPET  (1)
       REPORT         1                0 KREPOR  (1)
       CHEAD          8                0 KHEAD   (1)              1 KRETUR  (1)            2 KOLUMN (1)
                                       3 IR      (1)              4 JCL     (1)            5 JCU    (1)
                                       6 LSUB    (1)              7 LSKIP   (1)

STATISTICS
  PROGRAM LENGTH                1155B     621
  CM LABELED COMMON LENGTH       132B      90
          52000B CM USED
```

```
      C                                                                   FLOP       2
            SUBROUTINE FLOP (ACH,RHOP,SRATIO,ISAVFO,KFIRST)               FLOP       3
      C                                                                   FLOP       4
            INTEGER YES                                                   FLOP       5
      C     FLUTTER SOLUTION BY P-K METHOD                                FLOP       6
      C                                                                   FLOP       7
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS  FLOP       8
      C     COMPLEX*16          SUM                                       FLOP       9
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    FLOP      10
      C                                                                   FLOP      11
      CCDC  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS FLOP  12
            COMPLEX SUM                                                   FLOP      13
            COMPLEX GKECS(40,40),AECS(40,40),SOLECS(40,100)               FLOP      14
            COMMON /FLPCOM/ GKECS,SOLECS,AECS                             FLOP      15
      CCDC  ENDING OF TYPE STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS  FLOP     16
      C                                                                   FLOP      17
            DIMENSION XK(15)                                              FLOP      18
            DIMENSION        LC(40) ,        V(25)                        FLOP      19
            DIMENSION       NEL(20) ,  IPERM(100) ,     VV(100)           FLOP      20
            DIMENSION     DAMP(100) ,   FREQ(100) ,  CFREQ(100)           FLOP      21
            DIMENSION       VZA(20) ,     VQ(100) ,     VT(100)           FLOP      22
            DIMENSION        IT(80) ,      JT(80) ,    VEQ(100)           FLOP      23
            DIMENSION       OMG(40) ,    NIND(40) ,    DMPP(40)           FLOP      24
            DIMENSION     WW(40,40) ,     OMM(40)                         FLOP      25
            DIMENSION ITAPES(50)                                          FLOP      26
            DIMENSION STOR(9600)                                          FLOP      27
      C                                                                   FLOP      28
            COMPLEX     SOLTMP(40,1)                                      FLOP      29
            COMPLEX        ROOT(80) , SOLV(40,100) ,  SOL(40,100)         FLOP      30
            COMPLEX     SOLL(40,10) ,  SOLT(40,10) ,            F         FLOP      31
            COMPLEX       B(40,40) , DETAD(40,40) ,      Q(40,40)         FLOP      32
            COMPLEX     QRS(40,40) ,        VLAMB ,         S(40)         FLOP      33
            COMPLEX        VECC(40) ,     VECR(40) ,   IDMODE(40)         FLOP      34
            COMPLEX      FF(40,40) ,        H(40) ,           CMT         FLOP      35
            COMPLEX      AA(40,40) ,        VLAMA                         FLOP      36
            COMPLEX       A(40,40) ,    GK(40,40) ,           GKK         FLOP      37
            COMPLEX          COMSCA                                       FLOP      38
      C                                                                   FLOP      39
            COMMON /KZERO / KO, XK                                        FLOP      40
            COMMON / COMA  / LC, BR                                       FLOP      41
            COMMON /FLEXT / GK,OMG,RHO,VB                                 FLOP      42
            COMMON /MODD  / Q, DETAD, WW, OMM, NC                         FLOP      43
            COMMON /FITR  / NOMI, NIND                                    FLOP      44
            COMMON /FLUTB/ V,NV,DV                                        FLOP      45
            COMMON /FLUTV / V1    ,V2     ,FLO   ,FHI   ,IE    ,NQZ   ,NVTOT  FLOP  46
            COMMON /FACE/ SCALE , FACT , PROD , EM , ROWS , VELOC         FLOP      47
            COMMON  /DETAIL/ EPS , LVEC                                   FLOP      48
            COMMON / CTAPES / ITAPES                                      FLOP      49
            COMMON /FLUT/ VECC,VECR,VELEQ,FRQSQ,C,NMODE,IDMODE            FLOP      50
            COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT,  FLOP   51
           1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND,  FLOP 52
           2              IFIN,KLUB,KLUQ,MORBAL,DBAL                      FLOP      53
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   FLOP    54
           1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                  FLOP      55
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA  FLOP    56
           1                ,ITAPET                                       FLOP      57
            COMMON /CONSTS/ NO    ,YES                                    FLOP      58
```

```
      COMMON /STORES/ NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)
     A                ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)
     B                ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)
     C                ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)
     D                ,STRRDO(5,3),STRRDN(5,3),SCAALE(5,7)
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD
      COMMON / VSAVE / VNSAVE, VOSAVE
C
      EQUIVALENCE (STOR(1),SOL(1,1),SOLV(1,1),A(1,1),AA(1,1))
      EQUIVALENCE (STOR(3201),                  B(1,1))
      EQUIVALENCE (STOR(6401),                 FF(1,1))
C
CCDC
      LEVEL 3, GKECS,SOLECS,AECS
CCDC
C
C INITIAL CONDITIONS
C
      CALL PROGNA (4H(FLO, 4HP   ))
      ITAPEW = ITAPES(6)
      MTAP2  =  ITAPES(22)
      MTAP1  =  ITAPES(37)
      ITAPE = ITAPES(50)
C
CIBM
C     ITAPSL = 58
C     ITAPRM = 59
CIBM
C
      KO = 0
      MID = 40
C
C AUTOMATIC EXCLUSION OF MODES BASED ON RATIOS OF
C GENERALZED FORCES TO GENERALIZED MASSES
C
      IF (LC(38).NE.1)  GO TO 105
C
CIBM
C     REWIND ITAPRM
CIBM
C
C
C     TEMPORARILY MOVE GK ONTO I/O UNIT TO HAVE THIS SPACE
C     AVAILABLE FOR REDUCED-MODE VERSION
C
CIBM
C     WRITE (ITAPRM) GK
CIBM
C
CCDC
      MIDSQ2 = MID * MID * 2
      CALL WRITEC(GK(1,1),GKECS(1,1),MIDSQ2)
CCDC
C
C     PERFORM REDUCTION
C
      CALL REDMOD (NLEFT)
```

```
      GO TO 110                                                   FLOP     116
C                                                                 FLOP     117
C                                                                 FLOP     118
  105 CONTINUE                                                    FLOP     119
      NLEFT = LC(2)                                               FLOP     120
C                                                                 FLOP     121
  110 CONTINUE                                                    FLOP     122
C                                                                 FLOP     123
      IF( ISTEP.LE.1) GO TO 2                                     FLOP     124
      ICT = 0                                                     FLOP     125
      VTEST = VNEW/SQRT(RHOP)                                     FLOP     126
    1 VTEST2= DV                                                  F.OP     127
      IF( VTEST2.GT.200.0) VTEST2 = 200.0                         FLOP     128
      VXL = VTEST - VTEST2                                        FLOP     129
      VXP = ALOG10(VXL)                                           FLOP     130
      IEXP = IFIX(VXP)                                            FLOP     131
      VXL = VXL * 10.0 ** ( -IEXP)                                FLOP     132
      IXN = IFIX(VXL)                                             FLOP     133
      VXL = IXN * ( 10.0 ** ( IEXP))                              FLOP     134
      IF(VXL.LT.100.0) VXL = 100.0                                FLOP     135
      V(1) = VXL                                                  FLOP     136
      V(2)  = VXL + DV                                            FLOP     137
      V(3)  = VXL + DV*2.                                         FLOP     138
      NV = 3                                                      FLOP     139
    2 CONTINUE                                                    FLOP     140
C                                                                 FLOP     141
      ITER = IE                                                   FLOP     142
      NORIG = LC(2)                                               FLOP     143
      NQ = NLEFT                                                  FLOP     144
      IVEC  =  LC(28)                                             FLOP     145
      LRTL = LC(20)                                               FLOP     146
      LVTP = LC(19)                                               FLOP     147
      IPLOT = LC(15)                                              FLOP     148
      PLOTG = LC(14)                                              FLOP     149
      LVEC     =  0                                               FLOP     150
      EPS      =  1.E-5                                           FLOP     151
      NSIG     =  5                                               FLOP     152
      ITMAX    =  200                                             FLOP     153
      DFL1     = -.005                                            FLOP     154
      DFL2     = -.003                                            FLOP     155
      IF ( LRTL .GT. 1 )      LVEC = 1                            FLOP     156
      IJK      =  0                                               FLOP     157
      NVTOT  =  NV                                                FLOP     158
      DO 4 J = 1,NV                                               FLOP     159
      KLUE     =  0                                               FLOP     160
      KJI      =  J + 4*IJK                                       FLOP     161
      IF ( KJI .GT. 100 )     GO TO 64                            FLOP     162
      VQ(KJI)  =  V(J)                                            FLOP     163
      VB = V(J) * 1.6878 / BR                                     FLOP     164
      IF (J.NE.1) GO TO 5                                         FLOP     165
      L = 0                                                       FLOP     166
      DO 6  II = 1,NQ                                             FLOP     167
      IF (ITER.EQ.1) GO TO 7                                      FLOP     168
      DO 8 JJ = 1,NOMI                                            FLOP     169
      IF (NIND(JJ).EQ II) GO TO 6                                 FLOP     170
    8 CONTINUE                                                    FLOP     171
    7 L = L + 1                                                   FLOP     172
```

```
      RIMP     =  OMG(II) / VB
      ROOT(2*L-1)  =  CMPLX (-.05*RIMP,RIMP)
      ROOT(2*L)=CONJG(ROOT(2*L-1))
    6 CONTINUE
      NQZ      =  L
      EM = L
    5 IF ( J .EQ. 1 )          GO TO 30
      NQZ1     =  2 * NQZ
C         PREDICT NEXT ROOTS
      CALL RTIN (NQZ,SOLV,ROOT,KJI,VQ,MID,LC(18))
C
   30 NQU      = NQZ
      WWF      =  1.0
      ANQZ     =  1.0 / NQZ
      DO 33  II = 1,NQ
      IF ( ITER .EQ. 1 )       GO TO 66
      DO 67  JJ = 1,NOMI
      IF ( NIND(JJ) .EQ. II )       GO TO 33
   67 CONTINUE
   66 WWF      =  WWF * (WW(II,II)*OMG(II)*OMG(II))**ANQZ
   33 CONTINUE
      ROWS     =  1.0 / WWF
      IF ( LRTL .GT. 0 ) NQU =-NQZ
      NQZ1=NQZ*2
      NQU1=NQU*2
      VELOC    =  VQ(KJI)
      CALL ZANLYN (F,EPS,NSIG,NQZ1,NQU1,ROOT,ITMAX,JT,IER)
      IF ( LC(17) .EQ. 0 )     GO TO 9
      IF ( J .EQ. 1 .AND. IJK .EQ. 0 .AND. NQU1 .GT. 0 )
     1WRITE (ITAPEW,77)
      WRITE (ITAPEW,78)  VELOC, (JT(III), III=1,NQZ1,2)
    9 IF ( J .EQ. 1 )          GO TO 4000
      IF ( J .EQ. 2 )          KLUE = 1
      DO 41  K = 1,NQZ
      RL       =  REAL(SOLV(K,KJI-1))
      RT       =  REAL(ROOT(2*K-1))
      IF ( SIGN(1.0,RL) .NE. SIGN(1.0,RT) )       KLUE=1
      IF ( KLUE .EQ. 1 .OR. KJI .LE. 2 )     GO TO 49
      RA       =  REAL(SOLV(K,KJI-2)) / AIMAG(SOLV(K,KJI-2))
      RB       =  REAL(SOLV(K,KJI-1)) / AIMAG(SOLV(K,KJI-1))
      RD       =  REAL(ROOT(2*K-1)) / AIMAG(ROOT(2*K-1))
      DELL     =  RB - RA
      DELR     =  RD - RB
      IF ( SIGN(1.0,DELL) .NE. SIGN(1.0,DELR) )   KLUE = 1
      IF ( KLUE .EQ. 1 )       GO TO 41
      IF ( SIGN(1.0,DELR) .GT. 0.0 )         KLUE = 1
      IF ( KLUE .EQ. 1 )       GO TO 41
      OM1      =  VQ(KJI-2) * ABS(AIMAG(SOLV(K,KJI-2)))
   49 IF ( KLUE .EQ. 1 )       GO TO 41
      OM2      =  VQ(KJI-1) * ABS(AIMAG(SOLV(K,KJI-1)))
      OM3      =  VQ(KJI)   * ABS(AIMAG(ROOT(2*K-1)))
      IF ( KJI .GT. 2 )        GO TO 52
      FRTST    =  ABS ( (OM3 - OM2) / OM2 )
      IF ( FRTST .GT. 0.1 )  KLUE = 1
      GO TO 41
   52 DIFIA    =  OM2 - OM1
      DIFIB    =  OM3 - OM2
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                387     DEFINED    348
  3277  LRTL       INTEGER                      REFS       155     194     DEFINED    145
     1  LVEC       INTEGER           DETAIL     REFS        47     619     624     DEFINED    149     155
  3300  LVTP       INTEGER                      REFS       448     DEFINED    146
  3261  MID        INTEGER                      REFS     2*108     181     239     249     261     310     449
                                                467        587     617     620     625     626     701
                                                DEFINED     88
  3262  MIDSQ2     INTEGER                      REFS       109     727     DEFINED    108
    26  MORBAL     INTEGER           KLUES      REFS        50
     5  MSADD      INTEGER           KLUES      REFS        50
  3257  MTAP1      INTEGER                      DEFINED     79     I/O REFS    475     500
  3256  MTAP2      INTEGER                      DEFINED     78     I/O REFS    498
     2  M1         INTEGER           STRCLU     REFS        63
     3  M2         INTEGER           STRCLU     REFS        63
     4  M3         INTEGER           STRCLU     REFS        63
     5  M4         INTEGER           STRCLU     REFS        63
    13  NBAR       INTEGER           KLUES      REFS        50
 17550  NC         INTEGER           MODD       REFS        42
     3  NCOLS      INTEGER           CTABLE     REFS        55     DEFINED    511     640
     4  NCOLST     INTEGER           CTABLE     REFS        55
    20  NCYC       INTEGER           KLUES      REFS        50
 26220  NEL        INTEGER   ARRAY              REFS        19     349     369     DEFINED    341
    14  NFIX       INTEGER           KLUES      REFS        50
     1  NIND       INTEGER   ARRAY   FITR       REFS        23      43     169     189     598     615     683
                                                702
  3263  NLEFT      INTEGER                      REFS       114     143     DEFINED    119
   243  NMODE      INTEGER           FLUT       REFS        49
    21  NNN        INTEGER           KLUES      REFS        50
     0  NO         INTEGER           CONSTS     REFS        57     505     506
  3406  NODD       INTEGER                      REFS       494     495     DEFINED    489
     0  NOMI       INTEGER           FITR       REFS        43     168     188     598     615     683     702
  3274  NORIG      INTEGER                      REFS       591     592   2*598     612     613   2*615   2*683
                                                2*702   DEFINED    142
     6  NPAGE      INTEGER           CLIST      REFS        53
     6  NPAGEA     INTEGER           CTABLE     REFS        55
     6  NPAS       INTEGER           KLUES      REFS        50
     1  NPASS      INTEGER           CTABLE     REFS        55
  3275  NQ         INTEGER                      REFS       166     186     DEFINED    143
  3320  NQU        INTEGER                      REFS       196     DEFINED    183     194
  3323  NQU1       INTEGER                      REFS       198     200     252     366     DEFINED    196
     5  NQZ        INTEGER           FLUTV      REFS        45     179     181     183     185     194     195
                                                205        233     239     249     255     261     278     306
                                                310        317     322     342     360     381     386     395
                                                416        444     449     459     475     485     558   2*598
                                                606      2*615     617     620     622     625     626     627
                                                645        660     669     674     676     679     681   2*683
                                                684        686     689     694   2*702     703     705     707
                                                710     DEFINED    176
  3317  NQZ1       INTEGER                      REFS       198     202     252     254     287     303     366
                                                368        425     441     607     670     DEFINED    179     195
     2  NROWS      INTEGER           CTABLE     REFS        55     DEFINED    512     641
  3303  NSIG       INTEGER                      REFS       198     252     366     DEFINED    151
     0  NUMSTR     INTEGER           STORES     REFS        58
    31  NV         INTEGER           FLUTB      REFS        44     157     158     266     DEFINED    138
     6  NVTOT      INTEGER           FLUTV      REFS        45     239     261     267     269     275     296
                                                310        311     392     393     394     396     402     407
                                                413        434     449     454     467     475     486     498
```

```
VARIABLES      SN  TYPE            RELOCATION
27712  JT          INTEGER    ARRAY              REFS        22       198       202       252       254       366       368
                                                  617       626
 3326  K           INTEGER                       REFS       206       207     2*210     2*211     2*212       219       221
                                                  222     2*234     3*235       276       277       287     2*303     3*307
                                                2*312       324       325       326     2*327     2*328       329       335
                                                  341       414       415       425     2*441     3*445     2*490       492
                                                  522       675     3*677     2*680     2*682       685     3*687     2*690
                                                2*695   DEFINED       205       233       275       296       311       323
                                                  413       434       485       674       679       681       684       689
                                                  694
    7  KBPAGE      INTEGER           CLIST       REFS        53
    1  KCONST      INTEGER           STORES      REFS        58
 3346  KCR         INTEGER                       REFS       239       261       310       336       449       467
                                              DEFINED       335       400       465       571
    0  KFIRST      INTEGER            F.P.       REFS       505   DEFINED         2       482       506
 3400  KINC        INTEGER                       REFS       550   DEFINED       468       542
 3312  KJI         INTEGER                       REFS       161       162       181       197       206       209     2*210
                                                2*211     2*219     2*221       222       223       234     3*235       239
                                                2*242   DEFINED       160
 3353  KK          INTEGER                       REFS     2*279     3*307     2*417     3*445   DEFINED       278       306
                                                  416       444
 3351  KL          INTEGER                       REFS     2*256     3*257   DEFINED       255
    4  KLABEL      INTEGER           CLIST       REFS        53
   24  KLUB        INTEGER           KLUES       REFS        50
    4  KLUBAL      INTEGER           KLUES       REFS        50
 3311  KLUE        INTEGER                       REFS       209       216       218       220       232
                                              DEFINED       159       204       208       215       217       225       229
                                                  263
    3  KLUMD       INTEGER           KLUES       REFS        50
    1  KLUNAL      INTEGER           KLUES       REFS        50
   25  KLUQ        INTEGER           KLUES       REFS        50
    0  KLUSE       INTEGER           KLUES       REFS        50       584       657
 3354  KNV         INTEGER                       REFS       339       340       341       343       344       346       348
                                              DEFINED       321       339
    0  KOUNT       INTEGER           CLIST       REFS        53       504       510       519       521       525       639
                                              DEFINED       483       510       519       521       525       634       639
   11  KOUNTH      INTEGER           CLIST       REFS        53       504
   12  KOUNTI      INTEGER           CLIST       REFS        53
    1  KPAGE       INTEGER           CLIST       REFS        53
 3344  KPNT        INTEGER                       REFS       239       261       310       332       333       397       398
                                                  449       452       473       497       526       556       712       713
                                              DEFINED       316       332       397       573
    0  KTABLE      INTEGER           CTABLE      REFS        55   DEFINED       513       642
    5  KTABLO      INTEGER           CTABLE      REFS        55
    5  KTPAGE      INTEGER           CLIST       REFS        53
 3355  KZ          INTEGER                       REFS       323   DEFINED       322
    0  KO          INTEGER           KZERO       REFS        39   DEFINED        87
 3313  L           INTEGER                       REFS       171       173     2*174       176       177     2*677     2*687
                                              DEFINED       165       171       676       686
    0  LC          INTEGER    ARRAY  COMA        REFS        18        40        93       119       142       144       145
                                                  146       147       148       181       199       235       238       249
                                                  253       257       260       367       474       499       584       657
                                                  719
    2  LINES       INTEGER           CLIST       REFS        53       483       634
   10  LINESG      INTEGER           CLIST       REFS        53
    3  LINEST      INTEGER           CLIST       REFS        53
 3361  LL          INTEGER                       REFS       349       350       352       354       361       369       382
```

```
VARIABLES        SN  TYPE              RELOCATION
   244  IDMODE       COMPLEX    ARRAY    FLUT       REFS         33       49
     7  IDNOPT       INTEGER             KLUES      REFS         50
    76  IDSTR        INTEGER    ARRAY    STORES     REFS         58
    40  IDYDOF       INTEGER    ARRAY    STORES     REFS         58
     4  IE           INTEGER             FLUTV      REFS         45      141      475
  3324  IER          INTEGER                        REFS        198      252      366
  3271  IEXP         INTEGER                        REFS        131      133  DEFINED      130
    23  IFIN         INTEGER             KLUES      REFS         50  DEFINED      713
  3314  II           INTEGER                        REFS        169      172      189    4*191      277      279    2*343
                                                   2*344      2*361    2*362    2*382    2*387    2*396      415      417
                                                     455        458      460      461      465    3*593    4*594      597
                                                   2*614      2*661    2*705  DEFINED      166      186      276      342
                                                     360        381      386      395      414      454      459      591
                                                     612        660      703
  3325  III          INTEGER                        REFS        202      254      368  DEFINED      202      254      368
  3307  IJK          INTEGER                        REFS        160      200      241      244      266
                                                 DEFINED        156      241
  3371  INDX         INTEGER                        REFS        370    2*371  DEFINED      369
 26252  IPERM        INTEGER    ARRAY               REFS         19      269      276      407      414
  3301  IPLOT        INTEGER                        REFS        494      495  DEFINED      147
     2  IRED         INTEGER             KLUES      REFS         50
     0  ISAVFO       INTEGER   *UNUSED    F.P.   DEFINED          2
     2  ISTDOF       INTEGER    ARRAY    STORES     REFS         58
     1  ISTEP        INTEGER             STRCLU     REFS         63      123
 27572  IT           INTEGER    ARRAY               REFS         22      620      625
  3260  ITAPE        INTEGER                        REFS        587      701  DEFINED       80
     0  ITAPES       INTEGER    ARRAY    CTAPES     REFS         25       48       77       78       79       80
     7  ITAPET       INTEGER             CTABLE     REFS         55
  3255  ITAPEW       INTEGER                        REFS        507      509      518      524      636      638      646
                                                 DEFINED         77  I/O REFS      200      202      254      368      508
                                                     517        522      550      562      566      576      580      619
                                                     624        637      645      651      658      659      661      692
                                                     693        695      696      710      712      734
  3360  ITEN         INTEGER                        REFS        355      357      373  DEFINED      347      355
  3273  ITER         INTEGER                        REFS        167      187      451      555  DEFINED      141
  3421  ITER8        INTEGER                        REFS        620      625
  3304  ITMAX        INTEGER                        REFS        198      252      366  DEFINED      152
  3407  IV           INTEGER                        REFS      6*522  DEFINED      502
  3276  IVEC         INTEGER                        REFS        453  DEFINED      144
  3272  IXN          INTEGER                        REFS        133  DEFINED      132
  3362  IZ           INTEGER                        REFS        350      352      400      402  DEFINED      349
  3412  I1           INTEGER                        REFS        559  DEFINED      558
  3310  J            INTEGER                        REFS        160      162      163      164      178      200      203
                                                     204        244      245    3*318      320      329      487    2*488
                                                     489      3*490    2*491    3*492    2*493      494      495    3*498
                                                   3*500        532      536    4*537      539    3*540      541      543
                                                     544        545      546  DEFINED      158      317      319      486
                                                     498        500      531      535
  3401  JINC         INTEGER                        REFS        550  DEFINED      469      543
  3315  JJ           INTEGER                        REFS        169      189      244      245      324      325      326
                                                   2*327        334      336    3*340      343      344      351      353
                                                   3*593      4*594      597    2*614  DEFINED      168      188      243
                                                     320        592      613
  3420  JJJ          INTEGER                        REFS      2*607    2*670  DEFINED      606      669
  3405  JK         * INTEGER                     DEFINED        487
  3350  JL           INTEGER                        REFS        245      247      249      251      256    3*257      261
                                                 DEFINED        244
```

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VARIABLES       SN  TYPE            RELOCATION
25700  AECS         COMPLEX    ARRAY  FLPCOM       REFS        13        14        71       607       670
 3322  ANQZ         REAL                           REFS       191   DEFINED       185
11626  B            COMPLEX    ARRAY               REFS        31        67       617       620       625
                                                DEFINED       597
   50  BR           REAL              COMA         REFS        40       163       239       247       261       310       364
                                                    449       492       588       589       590       649
  242  C            REAL              FLUT         REFS        49       710   DEFINED       709
27072  CFREQ        REAL       ARRAY               REFS        20       498       500       522       546
                                                DEFINED       493
 3424  CFRQCR       REAL                           REFS       651   DEFINED       650
 3247  CMT          COMPLEX                        REFS        34       680       682       690       696
                                                DEFINED       678       680       688       690
   15  D            REAL              KLUES        REFS        50
26562  DAMP         REAL       ARRAY               REFS        20       491       498       500       522       532       536
                                                  4*537       539     3*540       545   DEFINED       490       491
 3422  DAMPCR       REAL                           REFS       651   DEFINED       648
   27  DBAL         REAL              KLUES        REFS        50
   16  DEL          REAL              KLUES        REFS        50
 3334  DELL         REAL                           REFS       215   DEFINED       213
 3335  DELR         REAL                           REFS       215       217   DEFINED       214
 3347  DELV         REAL                           REFS       245   DEFINED       242
 6200  DETAD        COMPLEX    ARRAY  MODD         REFS        31        42     2*594
 3305  DFL1         REAL                           REFS       539   DEFINED       153
 3306  DFL2         REAL                           REFS       540   DEFINED       154
 3373  DIFF         REAL                           REFS       375   DEFINED       374
 3342  DIFIA        REAL                           REFS       229   DEFINED       227
 3343  DIFIB        REAL                           REFS       229   DEFINED       228
 3374  DIFV         REAL                           REFS       390   DEFINED       389
 3403  DINC         REAL                           REFS       550   DEFINED       471       545
 3410  DMM          REAL                           REFS       532       533   DEFINED       530       532
 3357  DMP          REAL                           REFS       328       330   DEFINED       327
30176  DMPP         REAL       ARRAY               REFS        23       328       329   DEFINED       318       328
   32  DV           REAL              FLUTB        REFS        44       126       136       137       568
   12  DWMAX        REAL              KLUES        REFS        50
    3  EM           REAL              FACE         REFS        46   DEFINED       177
    0  EPS          REAL              DETAIL       REFS        47       198       252       366   DEFINED       150
   11  EPS1         REAL              KLUES        REFS        50
   17  EPS2         REAL              KLUES        REFS        50
 3243  F            COMPLEX                        REFS        30       198       252       366
    1  FACT         REAL              FACE         REFS        46
20026  FF           COMPLEX    ARRAY               REFS        34        68       620       625
    3  FHI          REAL              FLUTV        REFS        45       475
 3404  FINC         REAL                           REFS       550   DEFINED       472       546
    2  FLO          REAL              FLUTV        REFS        45       475
26726  FREQ         REAL       ARRAY               REFS        20       493       522   DEFINED       492
 3423  FRQCR        REAL                           REFS       650       651     2*656   DEFINED       649
  241  FRQSQ        REAL              FLUT         REFS        49   DEFINED       656
 3341  FRTST        REAL                           REFS       225   DEFINED       224
    0  GK           COMPLEX    ARRAY  FLEXT        REFS        36        41       109       614       683       687       727
    0  GKECS        COMPLEX    ARRAY  FLPCOM       REFS        13        14        71       109       727
 3253  GKK          COMPLEX                        REFS        36       708     2*709   DEFINED       707       708
42246  H            COMPLEX    ARRAY               REFS        34       625
   22  IBAND        INTEGER           KLUES        REFS        50
 3375  I\?R         INTEGER                        REFS       460       461   DEFINED       458
 3264  ICT          INTEGER                        REFS       473       497       526       557       567       581
                                                DEFINED       124       557
    0  ICYCLE       INTEGER           STRCLU       REFS        63
```

```
     3,5H MODE,5H   NO,4X,22H EQUIVALENT        TRUE,2X,9H    RATIO       FLOP    743
     4        ,2X,20H   CYC/SEC   RAD/SEC)                                FLOP    744
  28 FORMAT (10X,2I5,4X,2F11.4,1F11.6,2F11 4)                             FLOP    745
  53 FORMAT (10X, 4HRHO=,1P1E14.7,2X,11HLBS/CU.FT.,2X,4HFOR ,1I2          FLCP    746
     1        ,2X, 5HMODES)                                               FLOP    747
  54 FORMAT (10X,15HVELOCITY(KNOTS),12X,7HDAMPING,14X,9HFREQUENCY, /      FLOP    748
     1        7X,6HEQUIV.,10X4HTRUE,11X5HRATIO,10X6HC.P.S.,8X9HRAD./SEC.  FLOP    749
     2        //5X,2(F11.4,4X),F11.6,2(4X,F11 4))                         FLOP    750
  55 FORMAT (//20X10HROOT IS ( ,E14.7,3H , ,E14.7,2H ),/)                 FLOP    751
  56 FORMAT (/21X, 11HCOL. VECTOR,34X 10HROW VECTOR//)                    FLOP    752
  58 FORMAT (10X,2H( ,E14.7,2H, ,E14.7,2H ),11X,2H( ,E14.7,2H, ,E14.7,    FLOP    753
     1        3H  ),)                                                     FLOP    754
  63 FORMAT (//20X,53HROOT AND VECTORS FOR RUDISILL OPTIMIZATION FOR RO   FLOP    755
     1OT= ,G14.6//)                                                       FLOP    756
  65 FORMAT (1H1,/20X, 32HNUMBER OF VELOCITIES EXCEEDS 100, //            FLOP    757
     1             25X, 20HEXECUTION TERMINATED,//)                       FLOP    758
  69 FORMAT (//20X, 19HV(TRAN) * K * U  = ,2G14.6)                        FLOP    759
  70 FORMAT (1H1)                                                         FLOP    760
  77 FORMAT (1H1/)                                                        FLOP    761
  78 FORMAT (/,10X,15HFOR VELOCITY = ,F12.3,                              FLOP    762
     1           5X,30HNO. OF ITERATIONS PER ROOT ARE//                   FLOP    763
     2          (10X,20I5)//)                                             FLOP    764
  81 FORMAT (1H1,10X,31HINCIPIENT FLUTTER CONDI./ON FOR/                  FLOP    765
     1            15X,8HMODE     ,I5/                                     FLOP    766
     2            15X,25HVELOCITY (KNOTS-EQUIV) = ,F14.6/                 FLOP    767
     3            15X,25HDAMPING VALUE          = ,F14.6/                 FLOP    768
     4            15X,25HFREQUENCY (CPS)        = ,F14.6//)               FLOP    769
  83 FORMAT ( 1H , ////                                                   FLOP    770
     1        10X,45H(REAL(LAM*VTRANS*GRAD*U)+2*LAM/K) DIVIDED BY //      FLOP    771
     2        15X,26HIMAG(LAM*VTRANS*GRAD*U) = ,E16.7,                    FLOP    772
     3        8H    FOR ,I2,6H MODES///)                                  FLOP    773
  90 FORMAT(1H0,10X,47HTHERE IS NO FLUTTER IN SPECIFIED VELOCITY RANGE)   FLOP    774
  91 FORMAT(1H0,15X,F10.1,9H KNOTS TO,F10.1,6H KNOTS)                     FLOP    775
1620 FORMAT (10X,43                                                       FLOP    776
     1  HVELOCITY, DAMPING, AND FREQUENCY VARIATIONS                      FLOP    777
     2      ,/10X,43(1H-))                                                FLOP    778
1640 FORMAT (10X,47                                                       FLOP    779
     1  HCRITIAL FLUTTER SPEED AND ASSOCIATED PARAMETERS                  FLOP    780
     2      ,/10X,47(1H-))                                                FLOP    781
C                                                                         FLOP    782
      STOP                                                                FLOP    783
      END                                                                 FLOP    784
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
   3  FLOP            2          733

VARIABLES     SN  TYPE            RELOCATION
 3426  A          COMPLEX     ARRAY                 REFS       36      66     594     598     607     617     626
                                                 DEFINED      593     594
 3426  AA         COMPLEX     ARRAY                 REFS       35      66     670     677
    O  ACH        REAL       *UNUSED     F.P.    DEFINED        2
```

```
      S(K)      =  0.0                                                   FLOP     686
      DO 61  L = 1,NQZ                                                   FLOP     687
   61 S(K)      =  VECR(L) * GK(L,K) + S(K)                              FLOP     688
      CMT       =  0.0                                                   FLOP     689
      DO 62  K = 1,NQZ                                                   FLOP     690
   62 CMT       =  VECC(K) * S(K) + CMT                                  FLOP     691
      VLAM      =  AIMAG(VLAMA)**2                                       FLOP     692
      WRITE (ITAPEW,63)  VLAM                                            FLOP     693
      WRITE (ITAPEW,56)                                                  FLOP     694
      DO 68  K = 1,NQZ                                                   FLOP     695
   68 WRITE (ITAPEW,58)  VECC(K) , VECR(K)                               FLOP     696
      WRITE (ITAPEW,69) CMT                                              FLOP     697
C                                                                        FLOP     698
C                                                                        FLOP     699
C GRADIENT OF GENERALIZED AIR FORCES                                     FLOP     700
C                                                                        FLOP     701
      CALL QFLIN (ITAPE,VBO,QRS,RHO,2,MID)                               FLOP     702
      IF (NQZ.LT.NORIG)  CALL CONV (NORIG,NQZ,NOMI,NIND,QRS)             FLOP     703
      DO 82  II = 1,NQZ                                                  FLOP     704
      SUM   =  0.0                                                       FLOP     705
   82 S(II)  =  COMSCA (VECR(1),QRS(1,II),SUM,NQZ,1,1)                   FLOP     706
      SUM   =  0.0                                                       FLOP     707
      GKK   =   COMSCA (S(1),VECC(1),SUM,NQZ,1,1)                        FLOP     708
      GKK   =   VLAM * GKK                                               FLOP     709
      C     =   ( REAL(GKK) + 2.0*VLAM*VBO ) / AIMAG(GKK)                FLOP     710
      WRITE (ITAPEW,83) C, NQZ                                           FLOP     711
C        IF NO FLUTTER, NO REDESIGN IS WANTED. HENCE, SET IFIN TO ZERO.  FLOP     712
    3 IF (KPNT .EQ. 0) WRITE(ITAPEW,90)                                  FLOP     713
      IF (KPNT .EQ. 0) IFIN= 0                                           FLOP     714
C                                                                        FLOP     715
C IF NUMBER OF MODES WAS REDUCED PREVIOUSLY BASED ON                     FLOP     716
C RATIOS OF GENERALIZED FORCES TO GENERALIZED MASSES,                    FLOP     717
C RESET GK TO ORIGINAL VALUES TO PREPARE FOR NEXT PASS                   FLOP     718
C                                                                        FLOP     719
      IF (LC(38).NE.1)  GO TO 101                                        FLOP     720
C                                                                        FLOP     721
CIBM                                                                     FLOP     722
C     REWIND ITAPRM                                                      FLOP     723
C     READ (ITAPRM) GK                                                   FLOP     724
CIBM                                                                     FLOP     725
C                                                                        FLOP     726
CCDC                                                                     FLOP     727
      CALL READEC(GK(1,1),GKECS(1,1),MIDSQ2)                             FLOP     728
CCDC                                                                     FLOP     729
C                                                                        FLOP     730
  101 CONTINUE                                                           FLOP     731
C                                                                        FLOP     732
C                                                                        FLOP     733
      RETURN                                                             FLOP     734
   64 WRITE (ITAPEW,65)                                                  FLOP     735
C                                                                        FLOP     736
C                                                                        FLOP     737
C FORMATS                                                                FLOP     738
C                                                                        FLOP     739
   26 FORMAT (10X                                                        FLOP     740
     1,5H     ,5H     ,4X,22H    VELOCITY, KNOTS    ,2X,9H  DAMPING      FLOP     741
     2        ,2X,20H        FREQUENCY      ,/,10X,                      FLOP     742
```

```
      C
      C
      C CRITICAL FLUTTER SPEED AND ASSOCIATED RESULTS
      C
        100 CONTINUE
            CALL PROGNA (4H(FLO, 4HP  ))
            KOUNT  =  LINES
            CALL TITLES (2)
            CALL PLB (1,1,ITAPEW)
            WRITE (ITAPEW,1640)
            CALL PLB (1,1,ITAPEW)
            KOUNT  =  KOUNT + 4
            NCOLS  =  4
            NROWS  =  0
            KTABLE =  2
            CALL PTABLE (2,47,47
           1   HCRITIAL FLUTTER SPEED AND ASSOCIATED PARAMETERS)
            WRITE (ITAPEW,53) RHO, NQZ
            CALL PLB (1,1,ITAPEW)
            VELEQ  =  VELCR * SQRT (RHOP)
            DAMPCR   =  2.0 * REAL(VLAMB) / AIMAG(VLAMB)
            FRQCR    =  VELCR * 1.6878/BR * AIMAG(VLAMB)
            CFRQCR   =  FRQCR / 6.2832
            WRITE (ITAPEW,54) VELEQ , VELCR , DAMPCR , CFRQCR , FRQCR
            VOLD = VNEW
            VNEW = VELEQ
            VOSAVE = VNSAVE
            VNSAVE = VELEQ
            FRQSQ  = FRQCR*FRQCR
            IF(LC(36).EQ.0.AND.KLUSE.LT.1) GO TO 3
            WRITE (ITAPEW,55) VLAMA
            WRITE (ITAPEW,56)
            DO 57  II = 1,NQZ
         57 WRITE (ITAPEW,58)  VECC(II) , VECR(II)
      C
      CIBM
      C     REWIND ITAPSL
      C     READ (ITAPSL) AA
      CIBM
      C
      CCDC
            DO 906 JJJ=1,NQZ
            CALL READEC(AA(1,JJJ),AECS(1,JJJ),NQZ1)
        906 CONTINUE
      CCDC
      C
            DO 45  K = 1,NQZ
            S(K)     =  0.0
            DO 45  L = 1,NQZ
         45 S(K)     =  S(K) + VECR(L) * AA(L,K)
            CMT      =  0.0
            DO 59  K = 1,NQZ
         59 CMT      =  CMT + S(K) * VECC(K)
            DO 60  K = 1,NQZ
         60 VECR(K)  =  VECR(K)   CMT
            IF (NQZ.LT.NORIG)  CALL CONV (NORIG,NQZ,NOMI,NIND,GK)
            DO 61  K = 1,NQZ
```

```
      KCR = 1
      VLAMB = SOL(1,NVTOT)
      KPNT = 1
      GO TO 99
   98 CONTINUE
      WRITE(ITAPEW,90)
      VTEST = VV(1)
      X = VTEST
      Y = VV(NVTOT)
      WRITE(ITAPEW,91) X,Y
      IF( ICT .GE. 4 ) GO TO 99
      GO TO 1
   99 CONTINUE
      IF(LC(36).EQ.0.AND.KLUSE.LT.1) GO TO 100
C     VECTOR CALCULATION FOR CRITICAL FLUTTER SPEED
      VBO      =  ABS (1.0/AIMAG(VLAMB))
      CALL QFLIN (ITAPE,VBO,QRS,RHO,1,MID)
      VB       =   VELCR * 1.6878 / BR
      XX       =  RHO * VBO * BR
      XXX      =   XX * VBO * BR
      DO 50 II=1,NORIG
      DO 50 JJ=1,NORIG
      A(II,JJ)  =  WW(II,JJ) + QRS(II,JJ)
      A(II,JJ)  =  A(II,JJ)
     1         + CMPLX(REAL(DETAD(II,JJ))*XXX,AIMAG(DETAD(II,JJ))*XX)
C     AA(II,JJ) = A(II,JJ)
   50 B(II,JJ)  =  CMPLX (0.0,0.0)
      IF (NQZ.LT.NORIG)  CALL CONV (NORIG,NQZ,NOMI,NIND,A)
C
CIBM
C     REWIND ITAPSL
C     WRITE (ITAPSL) A
CIBM
C
CCDC
      DO 905 JJJ=1,NQZ
      CALL WRITEC(A(1,JJJ),AECS(1,JJJ),NQZ1)
  905 CONTINUE
CCDC
C
      VLAMA    =  VLAMB * VB
      DO 51 II=1,NORIG
      DO 51 JJ=1,NORIG
   51 QRS(II,JJ)  =  GK(II,JJ)
      IF (NQZ.LT.NORIG)  CALL CONV (NORIG,NQZ,NOMI,NIND,QRS)
C     CHANGE TO FORM FOR LAM**2*I + LAM*B + C
      CALL ADIV (A,B,QRS,NQZ,MID,JT)
C     COLUMN EIGENVECTOR CALCULATION
      IF ( LVEC .NE. 0 )      WRITE (ITAPEW,70)
      CALL GCVEC (B,QRS,VLAMA,NQZ,MID,IT,VECC,S,FF,ITER8)
C     NORMALIZE VECTOR
      CALL ORIENT (VECC,NQZ)
C     ROW VECTOR CALCULATION
      IF ( LVEC .NE. 0 )      WRITE (ITAPEW,70)
      CALL GRVEC (B,VLAMA,NQZ,MID,IT,VECR,H,FF,ITER8)
      CALL CLUTSL (A,VECR,NQZ,MID,JT,0)
      CALL ORIENT (VECR,NQZ)
```

```
      CALL PTABLE (2,43,43                                              FLOP 515
     1   HVELOCITY, DAMPING, AND FREQUENCY VARIATIONS)                  FLOP 516
  150 CONTINUE                                                          FLOP 517
      WRITE (ITAPEW,26)                                                 FLOP 518
      CALL PLB (1,1,ITAPEW)                                             FLOP 519
      KOUNT  =  KOUNT + 3                                               FLOP 520
  200 CONTINUE                                                          FLOP 521
      KOUNT  =  KOUNT +1                                                FLOP 522
      WRITE (ITAPEW,28) K,IV,VT(IV),VV(IV),DAMP(IV),CFREQ(IV),FREQ(IV)  FLOP 523
  300 CONTINUE                                                          FLOP 524
      CALL PLB (1,1,ITAPEW)                                             FLOP 525
      KOUNT  =  KOUNT + 2                                               FLOP 526
      IF( KPNT .EQ. 0 .AND. ICT .LT. 3 ) GO TO 24                       FLOP 527
C                                                                       FLOP 528
C INVESTIGATE INCIPIENT FLUTTER                                         FLOP 529
C                                                                       FLOP 530
      DMM   =  0.0                                                      FLOP 531
      DO 79  J = 1,NVTOT                                                FLOP 532
   79 DMM   =  DMM + ABS(DAMP(J))                                       FLOP 533
      IF ( ABS(DMM/FLOAT(NVTOT)) .LE. 3.E-4)      GO TO 24              FLOP 534
      NVTT  =  NVTOT - 1                                                FLOP 535
      DO 80  J = 2,NVTT                                                 FLOP 536
      IF ( DAMP(J) .GT. 0.0 )      GO TO 80                             FLOP 537
      IF ( DAMP(J-1) .GT. DAMP(J) .OR. DAMP(J+1) .GT. DAMP(J) )         FLOP 538
     1         GO TO 80                                                 FLOP 539
      IF ( DAMP(J) .LT. DFL1 )     GO TO 80                             FLOP 540
      IF ( DAMP(J-1)+DAMP(J)+DAMP(J+1) .LE. DFL2 )     GO TO 80         FLOP 541
      IF ( VT(J) .GT. VINC )       GO TO 80                             FLOP 542
      KINC    =  1                                                      FLOP 543
      JINC    =  J                                                      FLOP 544
      VINC    =  VT(J)                                                  FLOP 545
      DINC    =  DAMP(J)                                                FLOP 546
      FINC    =  CFREQ(J)                                               FLOP 547
      GO TO 24                                                          FLOP 548
   80 CONTINUE                                                          FLOP 549
   24 CONTINUE                                                          FLOP 550
      IF (KINC .NE. 0) WRITE (ITAPEW,81) JINC, VINC, DINC, FINC         FLOP 551
C                                                                       FLOP 552
C                                                                       FLOP 553
C GENERALIZED AIR FORCES AND ASSOCIATED PARAMETERS                      FLOP 554
C                                                                       FLOP 555
      IF ( ITER .NE. 1 )     GO TO 3                                    FLOP 556
      IF(KPNT.NE.0) GO TO 99                                            FLOP 557
      ICT = ICT + 1                                                     FLOP 558
      DO 97 I1 = 1,NQZ                                                  FLOP 559
      X = REAL( SOL(I1,1))                                              FLOP 560
      IF(X.GE.0.0) GO TO 98                                             FLOP 561
   97 CONTINUE                                                          FLOP 562
      WRITE(ITAPEW,90)                                                  FLOP 563
      VTEST = VV(NVTOT)                                                 FLOP 564
      X = VV(1)                                                         FLOP 565
      Y = VTEST                                                         FLOP 566
      WRITE(ITAPEW,91) X,Y                                              FLOP 567
      IF( ICT .GE. 4 ) GO TO 96                                         FLOP 568
      VTEST = VTEST + DV                                                FLOP 569
      GO TO 1                                                           FLOP 570
   96 VELCR = VV(NVTOT)                                                 FLOP 571
```

```
      GO TO 74                                                      FLOP 458
   73 ICR       =  II                                               FLOP 459
      DO 75  II = 1,NQZ                                             FLOP 460
      VLR       =   REAL (SOL(II,ICR)) -  REAL (VLAMB)              FLOP 461
      VLI       =  AIMAG (SOL(II,ICR)) -  AIMAG(VLAMB)              FLOP 462
      IF ( VLR .EQ. 0.0 .AND. VLI .EQ. 0.0 )      GO TO 76          FLOP 463
   75 CONTINUE                                                      FLOP 464
      GO TO 74                                                      FLOP 465
   76 KCR       =  II                                               FLOP 466
   74 CONTINUE                                                      FLOP 467
      CALL VECP (NVTOT,VV,SOL,KCR,V1,V2,MID)                        FLOP 468
   29 KINC  =  0                                                    FLOP 469
      JINC  =  1                                                    FLOP 470
      VINC  =  0.0                                                  FLOP 471
      DINC  =  0.0                                                  FLOP 472
      FINC  =  0.0                                                  FLOP 473
      IF( KPNT .EQ. 0 .AND. ICT .LT. 3 ) GO TO 86                   FLOP 474
      IF (LC(14) .EQ. 0)  GOTO 86                                   FLOP 475
      WRITE (MTAP1) V1,V2,FLO,FHI,IE,NQZ,NVTOT                      FLOP 476
   86 CONTINUE                                                      FLOP 477
C                                                                   FLOP 478
C                                                                   FLOP 479
C FLUTTER SOLUTION RESULTS                                          FLOP 480
C VELOCITY, DAMPING, AND FREQUENCY VARIATIONS                       FLOP 481
C                                                                   FLOP 482
      KFIRST =  YES                                                 FLOP 483
      KOUNT  =  LINES                                               FLOP 484
      CALL PROGNA (4H(FLO, 4HP  ))                                  FLOP 485
      DO 24 K = 1,NQZ                                               FLOP 486
      DO 25 J = 1,NVTOT                                             FLOP 487
      JK        =  J                                                FLOP 488
      VT(J)  =  VV(J) * SQRT (RHOP)                                 FLOP 489
      NODD   =  J                                                   FLOP 490
      DAMP(J)  =  REAL(SOL(K,J)) / AIMAG(SOL(K,J))                  FLOP 491
      DAMP(J)  =  2.0 * DAMP(J)                                     FLOP 492
      FREQ(J)  =  VV(J) * 1.6878/BR * AIMAG(SOL(K,J))               FLOP 493
      CFREQ(J) = FREQ(J) / 6.2832                                   FLOP 494
      IF ( IPLOT .EQ. 0 )     VEQ(NODD) = VT(J)                     FLOP 495
      IF ( IPLOT .NE. 0 )     VEQ(NODD) = VV(J)                     FLOP 496
   25 CONTINUE                                                      FLOP 497
      IF( KPNT .EQ. 0 .AND. ICT .LT. 3 ) GO TO 87                   FLOP 498
      WRITE(MTAP2) (CFREQ(J),DAMP(J),VEQ(J),J=1,NVTOT)              FLOP 499
      IF(LC(14).EQ.0) GO TO 87                                      FLOP 500
      WRITE (MTAP1)  (CFREQ(J),DAMP(J),VEQ(J),J=1,NVTOT)            FLOP 501
   87 CONTINUE                                                      FLOP 502
      DO 300 IV=1,NVTOT                                             FLOP 503
      CALL TITLES (2)                                               FLOP 504
      IF (KOUNT .GT. KOUNTH) GO TO 200                              FLOP 505
      IF (KFIRST .EQ. NO) GO TO 150                                 FLOP 506
      KFIRST =  NO                                                  FLOP 507
      CALL PLB (1,1,ITAPEW)                                         FLOP 508
      WRITE (ITAPEW,1620)                                           FLOP 509
      CALL PLB (1,1,ITAPEW)                                         FLOP 510
      KOUNT  =  KOUNT + 4                                           FLOP 511
      NCOLS  =  4                                                   FLOP 512
      NROWS  =  0                                                   FLOP 513
      KTABLE =  2                                                   FLOP 514
```

```
      KCR       =  IZ                                                    FLOP     401
C     -------------------------------------------------------------------FLOP     402
      VLAMB     =  SOLV (IZ,NVTOT)                                       FLOP     403
   14 CONTINUE                                                           FLOP     404
   12 CONTINUE                                                           FLOP     405
C     COLLECT TERMS AND REORDER ----------------                         FLOP     406
C                                                                        FLOP     407
      CALL AORDER (VQ,NVTOT,IPERM,1)                                     FLOP     408
C                                                                        FLOP     409
CIBM                                                                     FLOP     410
C     REWIND ITAPSL                                                      FLOP     411
CIBM                                                                     FLOP     412
C                                                                        FLOP     413
      DO 19 K = 1,NVTOT                                                  FLOP     414
      II = IPERM (K)                                                     FLOP     415
      VV(K)      =  VQ(II)                                               FLOP     416
      DO 20 KK = 1,NQZ                                                   FLOP     417
      SOLTMP(KK,1) = SOLV(KK,II)                                         FLOP     418
   20 CONTINUE                                                           FLOP     419
C                                                                        FLOP     420
CIBM                                                                     FLOP     421
C     WRITE (ITAPSL) SOLTMP                                              FLOP     422
CIBM                                                                     FLOP     423
C                                                                        FLOP     424
CCDC                                                                     FLOP     425
      CALL WRITEC(SOLTMP(1,1),SOLECS(1,K),NQZ1)                          FLOP     426
CCDC                                                                     FLOP     427
C                                                                        FLOP     428
   19 CONTINUE                                                           FLOP     429
C                                                                        FLOP     430
CIBM                                                                     FLOP     431
C     REWIND ITAPSL                                                      FLOP     432
CIBM                                                                     FLOP     433
C                                                                        FLOP     434
      DO 21 K = 1,NVTOT                                                  FLOP     435
C                                                                        FLOP     436
CIBM                                                                     FLOP     437
C     READ (ITAPSL) (SOL(KK,K),KK=1,NQZ)                                 FLOP     438
CIBM                                                                     FLOP     439
C                                                                        FLOP     440
CCDC                                                                     FLOP     441
      CALL READEC(SOL(1,K),SOLECS(1,K),NQZ1)                             FLOP     442
CCDC                                                                     FLOP     443
C                                                                        FLOP     444
      DO 22 KK = 1,NQZ                                                   FLOP     445
      IF ( AIMAG(SOL(KK,K)) .LT. 0.0 )  SOL(KK,K) = CONJG(SOL(KK,K))     FLOP     446
   22 CONTINUE                                                           FLOP     447
   21 CONTINUE                                                           FLOP     448
      IF ( LVTP .EQ. 0 )       GO TO 71                                  FLOP     449
      CALL FRORD (NVTOT,NQZ,VV,SOL,BR,KPNT,VELCR,KCR,MID,0,1)            FLOP     450
   71 CONTINUE                                                           FLOP     451
      IF ( ITER .NE. 1 )       GO TO 29                                  FLOP     452
      IF ( KPNT .EQ. 0 )       GO TO 29                                  FLOP     453
      IF ( IVEC .EQ.0 )        GO TO 29                                  FLOP     454
      DO 72  II =1,NVTOT                                                 FLOP     455
      IF ( VV(II) .EQ. VELCR )      GO TO 73                             FLOP     456
   72 CONTINUE                                                           FLOP     457
```

```
      SOLL(II,KNV)  =  SOLV(II,JJ)                                      FLOP     344
   34 SOLT(II,KNV)  =  SOLV(II,JJ-1)                                    FLOP     345
   13 CONTINUE                                                          FLOP     346
      IF ( KNV .EQ. 0 )       GO TO 12                                  FLOP     347
      ITEN      =  0                                                    FLOP     348
      DO 14 LL = 1,KNV                                                  FLOP     349
      IZ        =  NEL(LL)                                              FLOP     350
      RL        =  REAL (SOLL(IZ,LL))                                   FLOP     351
      VL        =  VQ(JJ)                                               FLOP     352
      RT        =  REAL (SOLT(IZ,LL))                                   FLOP     353
      VTT       =  VQ(JJ-1)                                             FLOP     354
      VC        =  VZA(LL)                                              FLOP     355
   15 ITEN      =  ITEN + 1                                             FLOP     356
      VCC       =  VC                                                   FLOP     357
      IF ( ITEN .EQ. 1 )      GO TO 39                                  FLOP     358
      VCC       =  VC                                                   FLOP     359
      RCP       =  RCC                                                  FLOP     360
   39 DO 16  II = 1,NQZ                                                 FLOP     361
      ROOT(2*II-1)  =  SOLT(II,LL) * VTT / VC                           FLOP     362
   16 ROOT(2*II)=CONJG(ROOT(2*II-1))                                    FLOP     363
      ROWS      =  1.0 / WWF                                            FLOP     364
      VB        = VC * 1.6878 / BR                                      FLOP     365
      VELOC     =  VC                                                   FLOP     366
      CALL ZANLYN (F,EPS,NSIG,NQZ1,NQU1,ROOT,ITMAX,JT,IER)              FLOP     367
      IF ( LC(17) .EQ. 0 )    GO TO 32                                  FLOP     368
      WRITE (ITAPEW,78)  VELOC, (JT(III), III=1,NQZ1,2)                 FLOP     369
   32 INDX      = 2 * NEL(LL) - 1                                       FLOP     370
      RC        = REAL (ROOT(INDX))                                     FLOP     371
      RCC       =  ABS (REAL(ROOT(INDX)) / AIMAG(ROOT(INDX)))           FLOP     372
      IF ( ABS(RC) .LE. 1.E-6 )    GO TO 17                             FLOP     373
      IF ( ITEN .EQ. 1 )      GO TO 40                                  FLOP     374
      DIFF      =  ABS (1.0 - ABS(RCC/RCP) )                            FLOP     375
      IF ( DIFF .LE. 1.E-5 )       GO TO 17                             FLOP     376
C                                                                       FLOP     377
   40 CONTINUE                                                          FLOP     378
      IF ( SIGN(1.0,RC) .EQ. SIGN(1.0,RT) )       GO TO 35              FLOP     379
      RL        =  RC                                                   FLOP     380
      VL        =  VC                                                   FLOP     381
      DO 36  II = 1,NQZ                                                 FLOP     382
   36 SOLL(II,LL)  =  ROOT(2*II-1)                                      FLOP     383
      GO TO 38                                                          FLOP     384
   35 RT        =  RC                                                   FLOP     385
      VTT       =  VC                                                   FLOP     386
      DO 37  II = 1,NQZ                                                 FLOP     387
   37 SOLT(II,LL)  =  ROOT(2*II-1)                                      FLOP     388
   38 VC        =  RT / (RT-RL) * (VL-VTT) + VTT                        FLOP     389
      DIFV      =  ABS (1.0 - ABS(VC/VCC) )                             FLOP     390
      IF ( DIFV .LE. 1.E-5 )       GO TO 17                             FLOP     391
      GO TO 15                                                          FLOP     392
   17 NVTOT = NVTOT + 1                                                 FLOP     393
      IF ( NVTOT .GT. 100 )        GO TO 64                             FLOP     394
      VQ(NVTOT)  =  VC                                                  FLOP     395
      DO 18 II = 1,NQZ                                                  FLOP     396
   18 SOLV(II,NVTOT)  = ROOT(2*II-1)                                    FLOP     397
      KPNT      =  KPNT + 1                                             FLOP     398
      IF ( KPNT .GT. 1 )      GO TO 14                                  FLOP     399
      VELCR     =  VC                                                   FLOP     400
```

```
      CCDC                                                                FLOP     287
            CALL WRITEC(SOLTMP(1,1),SOLECS(1,K),NQZ1)                     FLOP     288
      CCDC                                                                FLOP     289
      C                                                                   FLOP     290
        302 CONTINUE                                                      FLOP     291
      C                                                                   FLOP     292
      CIBM                                                                FLOP     293
      C     REWIND ITAPSL                                                 FLOP     294
      CIBM                                                                FLOP     295
      C                                                                   FLOP     296
            DO 303 K = 1,NVTOT                                            FLOP     297
      C                                                                   FLOP     298
      CIBM                                                                FLOP     299
      C     READ (ITAPSL) (SOL(KK,K),KK=1,NQZ)                            FLOP     300
      CIBM                                                                FLOP     301
      C                                                                   FLOP     302
      CCDC                                                                FLOP     303
            CALL READEC(SOL(1,K),SOLECS(1,K),NQZ1)                        FLOP     304
      CCDC                                                                FLOP     305
      C                                                                   FLOP     306
            DO 304 KK = 1,NQZ                                             FLOP     307
            IF(AIMAG(SOL(KK,K)).LT.0.0) SOL(KK,K) = CONJG(SOL(KK,K))      FLOP     308
        304 CONTINUE                                                      FLOP     309
        303 CONTINUE                                                      FLOP     310
            CALL FRORD (NVTOT,NQZ,VV,SOL,BR,KPNT,VELCR,KCR,MID,0,1)       FLOP     311
            DO 305 K = 1,NVTOT                                            FLOP     312
            VQ(K) = VV(K)                                                 FLOP     313
      C     DO 306 KK=1,NQZ                                               FLOP     314
      C 306 SOLV(KK,K) = SOL(KK,K)                                        FLOP     315
        305 CONTINUE                                                      FLOP     316
            KPNT      =  0                                                FLOP     317
            DO 85  J = 1,NQZ                                              FLOP     318
         85 DMPP(J)   =  ABS( REAL(SOLV(J,1)) / AIMAG(SOLV(J,1)) )        FLOP     319
            DO 12  J = 2,NVV                                              FLOP     320
            JJ        =  J                                                FLOP     321
            KNV       =  0                                                FLOP     322
            DO 13 KZ = 1,NQZ                                              FLOP     323
            K         = KZ                                                FLOP     324
            RL = REAL (SOLV(K,JJ))                                        FLOP     325
            RT  =  REAL (SOLV(K,JJ-1))                                    FLOP     326
            RR        =  REAL (SOLV(K,JJ+1))                              FLOP     327
            DMP       =  ABS (REAL(SOLV(K,JJ)) / AIMAG(SOLV(K,JJ)) )      FLOP     328
            DMPP(K)   =  DMPP(K) + DMP                                    FLOP     329
            IF (DMPP(K) / FLOAT (J) .LE. 1.E-5) GO TO 13                  FLOP     330
            IF (DMP .GT. 1.E-10) GO TO 48                                 FLOP     331
            IF ( SIGN(1.0,RT) .EQ. SIGN(1.0,RR) )       GO TO 13          FLOP     332
            KPNT      =  KPNT + 1                                         FLOP     333
            IF ( KPNT .GT. 1 )           GO TO 13                         FLOP     334
            VELCR     =  VQ(JJ)                                           FLOP     335
            KCR       =  K                                                FLOP     336
            VLAMB     =  SOLV (KCR,JJ)                                    FLOP     337
            GO TO 13                                                      FLOP     338
         48 IF ( SIGN(1.0,RL) .EQ. SIGN(1.0,RT) )       GO TO 13          FLOP     339
            KNV       =  KNV + 1                                          FLOP     340
            VZA(KNV)  = RT/(RT-RL) * (VQ(JJ)-VQ(JJ-1)) + VQ(JJ-1)         FLOP     341
            NEL(KNV) = K                                                  FLOP     342
            DO 34  II = 1,NQZ                                             FLOP     343
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      IF ( SIGN(1.0,DIFIA) .NE. SIGN(1.0,DIFIB) )      KLUE = 1            FLOP   230
   41 CONTINUE                                                             FLOP   231
      ROWS     =  1.0 / WWF                                                FLOP   232
 4000 IF ( KLUE .NE. 0 )      GO TO 42                                     FLOP   233
      DO 11  K = 1,NQZ                                                     FLOP   234
      SOLV(K,KJI)  =  ROOT(2*K-1)                                          FLOP   235
      IF ( LC(18) .NE. 0 .AND. AIMAG(SOLV(K,KJI)) .LT. 0.0 )               FLOP   236
     1              SOLV(K,KJI)  =  CONJG (SOLV(K,KJI))                    FLOP   237
   11 CONTINUE                                                             FLOP   238
      IF ( LC(18) .EQ. 0 )     GO TO 4                                     FLOP   239
      CALL FRORD (NVTOT,NQZ,VQ,SOLV,BR,KPNT,VELCR,KCR,MID,1,KJI)           FLOP   240
      GO TO 4                                                              FLOP   241
   42 IJK      =  IJK + 1                                                  FLOP   242
      DELV     =  VQ(KJI) - VQ(KJI-1)                                      FLOP   243
      DO 44  JJ = 1,5                                                      FLOP   244
      JL       =  J-1 + 4*(IJK-1) + JJ                                     FLOP   245
      VQ(JL)   =  V(J-1) + FLOAT(JJ)*DELV/5.0                              FLOP   246
C                                                                          FLOP   247
      VB       =  VQ(JL) * 1.6878 / BR                                     FLOP   248
C        PREDICT NEXT ROOTS                                                FLOP   249
      CALL RTIN (NQZ,SOLV,ROOT,JL,VQ,MID,LC(18))                           FLOP   250
C                                                                          FLOP   251
      VELOC    =  VQ(JL)                                                   FLOP   252
      CALL ZANLYN (F,EPS,NSIG,NQZ1,NQU1,ROOT,ITMAX,JT,IER)                 FLOP   253
      IF ( LC(17) .EQ. 0 )     GO TO 46                                    FLOP   254
      WRITE (ITAPEW,78)  VELOC, (JT(III), III=1,NQZ1,2)                    FLOP   255
   46 DO 47  KL = 1,NQZ                                                    FLOP   256
      SOLV(KL,JL)  =  ROOT(2*KL-1)                                         FLOP   257
      IF ( LC(18) .NE. 0 .AND. AIMAG(SOLV(KL,JL)) .LT. 0.0 )               FLOP   258
     1              SOLV(KL,JL)  =  CONJG (SOLV(KL,JL))                    FLOP   259
   47 CONTINUE                                                             FLOP   260
      IF ( LC(18) .EQ. 0 )     GO TO 44                                    FLOP   261
      CALL FRORD (NVTOT,NQZ,VQ,SOLV,BR,KPNT,VELCR,KCR,MID,1,JL)            FLOP   262
   44 CONTINUE                                                             FLOP   263
      KLUE     =  0                                                        FLOP   264
    4 CONTINUE                                                             FLOP   265
C     DETERMINE WHETHER FLUTTER OCCURS FOR ANY MODE -----------------      FLOP   266
      NVTOT    =  NV + 4*IJK                                               FLOP   267
      NVV      =  NVTOT                                                    FLOP   268
C                                                                          FLOP   269
      CALL AORDER(VQ,NVTOT,IPERM,1)                                        FLOP   270
C                                                                          FLOP   271
CIBM                                                                       FLOP   272
C     REWIND ITAPSL                                                        FLOP   273
CIBM                                                                       FLOP   274
C                                                                          FLOP   275
      DO 302 K = 1, NVTOT                                                  FLOP   276
      II = IPERM(K)                                                        FLOP   277
      VV(K) = VQ(II)                                                       FLOP   278
      DO 301 KK = 1, NQZ                                                   FLOP   279
      SOLTMP(KK,1) = SOLV(KK,II)                                           FLOP   280
  301 CONTINUE                                                             FLOP   281
C                                                                          FLOP   282
CIBM                                                                       FLOP   283
C     WRITE (ITAPSL) SOLTMP                                                FLOP   284
CIBM                                                                       FLOP   285
C                                                                          FLOP   286
```

VARIABLES		SN	TYPE		RELOCATION								
						500	502	531	533	534	563	570	572
						579	DEFINED	157	266	392			
3411	NVTT		INTEGER			REFS	535	DEFINED	534				
3352	NVV		INTEGER			REFS	319	DEFINED	267				
6200	OMG		REAL	ARRAY	FLEXT	REFS	23	41	172	2*191			
17500	OMM		REAL	ARRAY	MODD	REFS	24	42					
3336	OM1		REAL			REFS	227	DEFINED	219				
3337	OM2		REAL			REFS	2*224	227	228	DEFINED	221		
3340	OM3		REAL			REFS	224	228	DEFINED	222			
3302	PLOTG	*	REAL			DEFINED	148						
2	PROD		REAL		FACE	REFS	46						
0	Q		COMPLEX	ARRAY	MODD	REFS	31	42					
33726	QRS		COMPLEX	ARRAY		REFS	32	587	593	615	617	620	701
						702	705	DEFINED	614				
3331	RA		REAL			REFS	213	DEFINED	210				
3332	RB		REAL			REFS	213	214	DEFINED	211			
3372	RC		REAL			REFS	372	378	379	384	DEFINED	370	
3370	RCC		REAL			REFS	359	374	DEFINED	371			
3367	RCP		REAL			REFS	374	DEFINED	359				
3333	RD		REAL			REFS	214	DEFINED	212				
6250	RHO		REAL		FLEXT	REFS	41	587	589	645	701		
0	RHOP		REAL		F.P.	REFS	125	488	647	DEFINED	2		
3316	RIMP		REAL			REFS	2*173	DEFINED	172				
3327	RL		REAL			REFS	208	338	340	388	DEFINED	206	324
						350	379						
30366	ROOT		COMPLEX	ARRAY		REFS	29	174	181	198	207	2*212	222
						234	249	252	256	362	366	370	2*371
						382	387	396	DEFINED	173	174	361	362
4	ROWS		REAL		FACE	REFS	46	DEFINED	193	231	363		
3356	RR		REAL			REFS	331	DEFINED	326				
3330	RT		REAL			REFS	208	331	338	2*340	378	2*388	
						DEFINED	207	325	352	384			
42126	S		COMPLEX	ARRAY		REFS	32	620	677	680	687	690	707
						DEFINED	675	677	685	687	705		
362	SCAALE		REAL	ARRAY	STORES	REFS	58						
0	SCALE		REAL		FACE	REFS	46						
3426	SOL		COMPLEX	ARRAY		REFS	29	66	303	2*307	310	441	2*445
						449	460	461	467	2*490	492	559	572
						DEFINED	307	445					
6200	SOLECS		COMPLEX	ARRAY	FLPCOM	REFS	13	14	71	287	303	425	441
30626	SOLL		COMPLEX	ARRAY		REFS	30	350	DEFINED	343	382		
32266	SOLT		COMPLEX	ARRAY		REFS	30	352	361	DEFINED	344	387	
30246	SOLTMP		COMPLEX	ARRAY		REFS	28	287	425	DEFINED	279	417	
3426	SOLV		COMPLEX	ARRAY		REFS	29	66	181	206	2*210	2*211	219
						221	2*235	239	249	2*257	261	279	2*318
						324	325	326	2*327	336	343	344	402
						417	DEFINED	234	235	256	257	396	
0	SRATIO		REAL	*UNUSED	F.P.	DEFINED	2						
3426	STOR		REAL	ARRAY		REFS	26	66	67	68			
11	STPOLD		REAL		STRCLU	REFS	63						
305	STRIDN		REAL	ARRAY	STORES	REFS	58						
266	STRIDO		REAL	ARRAY	STORES	REFS	58						
122	STRII		REAL	ARRAY	STORES	REFS	58						
160	STRIN		REAL	ARRAY	STORES	REFS	58						
141	STRIO		REAL	ARRAY	STORES	REFS	58						
343	STRRDN		REAL	ARRAY	STORES	REFS	58						
324	STRRDO		REAL	ARRAY	STORES	REFS	58						

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VARIABLES      SN  TYPE             RELOCATION
   177  STRRI    REAL        ARRAY  STORES       REFS     58
   235  STRRN    REAL        ARRAY  STORES       REFS     58
   216  STRRO    REAL        ARRAY  STORES       REFS     58
   261  STRWDN   REAL        ARRAY  STORES       REFS     58
   254  STRWDO   REAL        ARRAY  STORES       REFS     58
   103  STRWI    REAL        ARRAY  STORES       REFS     58
   115  STRWN    REAL        ARRAY  STORES       REFS     58
   110  STRWO    REAL        ARRAY  STORES       REFS     58
  3241  SUM      COMPLEX                         REFS     12      705      707  DEFINED      704      706
     0  V        REAL        ARRAY  FLUTB        REFS     18       44      162      163      245
                                              DEFINED    135      136      137
  6251  VB       REAL               FLEXT        REFS     41      172      611  DEFINED      163      247      364
                                                  588
  3415  VBO      REAL                            REFS    587      589      590      701      709
                                              DEFINED    586
  3365  VC       REAL                            REFS    356      358      361      364      365      380      385
                                                  389    394      399  DEFINED      354      388
  3366  VCC      REAL                            REFS    389  DEFINED      356      358
    10  VDES     REAL               KLUES        REFS     50
     0  VECC     COMPLEX     ARRAY  FLUT         REFS     33       49      620      622      661      680      690
                                                  695    707
   120  VECR     COMPLEX     ARRAY  FLUT         REFS     33       49      625      626      627      661      677
                                                  682    687      695      705  DEFINED      682
  3345  VELCR    REAL                            REFS    239      261      310      449      455      588      647
                                                  649    651  DEFINED      334      399      570
   240  VELEQ    REAL               FLUT         REFS     49      651      653      655  DEFINED      647
     5  VELOC    REAL               FACE         REFS     46      202      254      368  DEFINED      197      251
                                                  365
 30032  VEQ      REAL        ARRAY               REFS     22      498      500  DEFINED      494      495
  3402  VINC     REAL                            REFS    541      550  DEFINED      470      544
  3363  VL       REAL                            REFS    388  DEFINED      351      380
  3425  VLAM     REAL                            REFS    692      708      709  DEFINED      691
  3251  VLAMA    COMPLEX                         REFS     35      620      625      658      691
                                              DEFI''ED   611
  3245  VLAMB    COMPLEX                         REFS     32      460      461      586      611    2*648      649
                                              DEFINED    336      402      572
  3377  VLI      REAL                            REFS    462  DEFINED      461
  3376  VLR      REAL                            REFS    462  DEFINED      460
    10  VNEW     REAL               STRCLU       REFS     63      125      652  DEFINED      653
     0  VNSAVE   REAL               VSAVE        REFS     64      654  DEFINED      655
     7  VOLD     REAL               STRCLU       REFS     63  DEFINED      652
     1  VOSAVE   REAL               VSAVE        REFS     64  DEFINED      654
 27262  VQ       REAL        ARRAY               REFS     21      181      197      219      221      222      239
                                                2*242    247      249      251      261      269      277      334
                                                3*340    351      353      407      415  DEFINED      162      245
                                                  312    394
     6  VS       REAL               STRCLU       REFS     63
 27426  VT       REAL        ARRAY               REFS     21      494      522      541      544
                                              DEFINED    488
  3265  VTEST    REAL                            REFS    128      565      568      578  DEFINED      125      563
                                                  568    577
  3266  VTEST2   REAL                            REFS    127      128  DEFINED      126      127
  3364  VTT      REAL                            REFS    361    2*388  DEFINED      353      385
 26416  VV       REAL        ARRAY               REFS     19      310      312      449      455      467      488
                                                  492    495      522      563      564      570      577      579
                                              DEFINED    277      415
  3267  VXL      REAL                            REFS    129      131      132      134      135      136      137
```

```
VARIABLES     SN  TYPE            RELOCATION
                                               DEFINED     128       131       133       134
  3270  VXP        REAL                           REFS     130   DEFINED       129
 27236  VZA        REAL      ARRAY                REFS      21       354   DEFINED       340
     0  V1         REAL                FLUTV      REFS      45       467       475
     1  V2         REAL                FLUTV      REFS      45       467       475
 14400  WW         REAL      ARRAY     MODD       REFS      24        42       191       593
  3321  WWF        REAL                           REFS     191       193       231       363   DEFINED       184       191
  3413  X          REAL                           REFS     560       566       580   DEFINED       559       564       578
     1  XK         REAL      ARRAY     KZERO      REFS      17        39
  3416  XX         REAL                           REFS     590       594   DEFINED       589
  3417  XXX        REAL                           REFS     594   DEFINED       590
  3414  Y          REAL                           REFS     566       580   DEFINED       565       579
     1  YES        INTEGER             CONSTS     REFS       4        57       482
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
        ADIV                  6             617
        ALOG10     REAL       1 LIBRARY     129
        AORDER                4             269       407
        CLUTSL                6             626
        COMSCA     COMPLEX    6              37       705       707
        CONV                  5             598       615       683       702
        FRORD                11             239       261       310       449
        GCVEC                10             620
        GRVEC                 9             625
        ORIENT                2             622       627
        PLB                   3             507       509       518       524       636       638       646
        PROGNA                2              76       484       633
        PTABLE                3             514       643
        QFLIN                 6             587       701
        READEC                3             303       441       670       727
        REDMOD                1             114
        RTIN                  7             181       249
        SQRT       REAL       1 LIBRARY     125       488       647
        TITLES                1             503       635
        VECP                  7             467
        WRITEC                3             109       287       425       607
        ZANLYN                9             198       252       366

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
        ABS        REAL       1  INTRIN               219       221       222       224       318       327       371       372
                                                    2*374     2*389       532       533       586
        AIMAG      REAL       1  INTRIN               210       211       212       219       221       222       235       257
                                                      307       318       327       371       445     2*461       490       492
                                                      586       594       648       649       691       709
        CMPLX      COMPLEX    2  INTRIN               173       594       597
        CONJG      COMPLEX    1  INTRIN               174       235       257       307       362       445
        FLOAT      REAL       1  INTRIN               245       329       533
        IFIX       INTEGER    1  INTRIN               130       132
        REAL       REAL       1  INTRIN               206       207       210       211       212       318       324       325
                                                      326       327       350       352       370       371     2*460       490
                                                      559       594       648       709
        SIGN       REAL       2  INTRIN             2*208     2*215       217     2*229     2*331     2*338     2*378

STATEMENT LABELS           DEF LINE    REFERENCES
   40  1                     126         569       582
   67  2                     139         123
```

STATEMENT	LABELS		DEF LINE	REFERENCES					
2177	3		712	555	657				
470	4		264	158	238	240			
160	5		178	164					
153	6		175	166	169				
143	7		171	167					
0	8		170	168					
250	9		203	199					
0	11		237	233					
1111	12		404	319	346				
671	13		345	322	329	331	333	337	338
1106	14		403	348	398				
712	15		355	391					
0	16		362	360					
1055	17		392	372	375	390			
0	18		396	395					
0	19		428	413					
0	20		418	416					
0	21		447	434					
0	22		446	444					
1461	24		549	485	526	533	547		
0	25		496	486					
2753	26	FMT	739	517					
2775	28	FMT	744	522					
1231	29		468	451	452	453			
165	30		183	178					
761	32		369	367					
207	33		192	186	189				
0	34		344	342					
1023	35		384	378					
0	36		382	381					
0	37		387	386					
1042	38		388	383					
717	39		360	357					
1001	40		377	373					
347	41		230	205	216	218	220	226	
401	42		241	232					
464	44		262	243	260				
0	45		677	674	676				
441	46		255	253					
0	47		259	255					
636	48		338	330					
323	49		220	209					
0	50		597	591	592				
0	51		614	612	613				
337	52		227	223					
3002	53	FMT	745	645					
3011	54	FMT	747	651					
3030	55	FMT	750	658					
3036	56	FMT	751	659	693				
0	57		661	660					
3043	58	FMT	752	661	695				
0	59		680	679					
0	60		682	681					
0	61		687	684	686				
0	62		690	689					
3052	63	FMT	754	692					
2211	64		734	161	393				

```
STATEMENT LABELS                DEF LINE   REFERENCES
 3062  65      FMT                 756       734
  202  66                          191       187
    0  67                          190       188
    0  68                          695       694
 3073  69      FMT                 758       696
 3100  70      FMT                 759       619       624
 1174  71                          450       448
    0  72                          456       454
 1207  73                          458       455
 1227  74                          466       457       464
    0  75                          463       459
 1225  76                          465       462
 3102  77      FMT                 760       200
 3104  78      FMT                 761       202       254       368
    0  79                          532       531
 1456  80                          548       535       536       537       539       540       541
 3115  81      FMT                 764       550
    0  82                          705       703
 3140  83      FMT                 769       710
    0  85                          318       317
 1243  86                          476       473       474
 1337  87                          501       497       499
 3156  90      FMT                 773       562       576       712
 3165  91      FMT                 774       566       580
 1514  96                          570       567
    0  97                          561       558
 1524  98                          575       560
 1536  99                          583       556       574       581
 1670  100                         632       584
 2210  101                         730       719
   27  105                         118        93
   31  110                         121       115
 1363  150                         516       505
 1371  200                         520       504
    0  300                         523       502
    0  301                         280       278
    0  302                         290       275
    0  303                         309       296
    0  304                         308       306
    0  305                         315       311
    0  905                         608       606
    0  906                         671       669
 3172  1620    FMT                 775       508
 3202  1640    FMT                 778       637
  354  4000                        232       203

LOOPS  LABEL    INDEX    FROM-TO    LENGTH   PROPERTIES
  117  4        J        158 264     354B              EXT REFS    EXITS   NOT INNER
  133  6        II       166 175      23B              NOT INNER
  136  8        JJ       168 170       5B     INSTACK    EXITS
  172  33       II       186 192      20B              EXT REFS  NOT INNER
  175  67       JJ       188 190       5B     INSTACK    EXITS
  240           III      202 202       7B              EXT REFS
  266  41       K        205 230      63B       OPT
  366  11       K        233 237       6B     INSTACK
  406  44       JJ       243 262      61B              EXT REFS  NOT INNER
  431           III      254 254       7B              EXT REFS
```

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LOOPS  LABEL   INDEX    FROM-TO    LENGTH    PROPERTIES
  452  47      KL       255 259       6B      INSTACK
  500  302     K        275 290      26B                EXT REFS  NOT INNER
  512  301     KK       278 280       3B      INSTACK
  527  303     K        296 309      24B                EXT REFS  NOT INNER
  543  304     KK       306 308       5B      INSTACK
  560  305     K        311 315       3B      INSTACK
  571  85      J        317 318       4B      INSTACK
  577  12      J        319 404     315B                EXT REFS    EXITS    NOT INNER
  602  13      KZ       322 345      72B                NOT INNER
  662  34      II       342 344       6B      INSTACK
  677  14      LL       348 403     212B                EXT REFS    EXITS    NOT INNER
  730  16      II       360 362       5B      INSTACK
  751          III      368 368       7B                EXT REFS
 1016  36      II       381 382       4B      INSTACK
 1035  37      II       386 387       4B      INSTACK
 1070  18      II       395 396       4B      INSTACK
 1116  19      K        413 428      26B                EXT REFS  NOT INNER
 1130  20      KK       416 418       3B      INSTACK
 1145  21      K        434 447      24B                EXT REFS  NOT INNER
 1161  22      KK       444 446       5B      INSTACK
 1201  72      II       454 456       5B      INSTACK     EXITS
 1211  75      II       459 463      13B         OPT      EXITS
 1251  24      K        485 549     213B                EXT REFS  NOT INNER
 1252  25      J        486 496      27B                EXT REFS
 1307          J        498 498      11B                EXT REFS
 1325          J        500 500      11B                EXT REFS
 1340  300     IV       502 523      50B                EXT REFS
 1422  79      J        531 532       4B      INSTACK
 1435  80      J        535 548      24B         OPT      EXITS
 1473  97      I1       558 561       6B      INSTACK     EXITS
 1555  50      II       591 597      24B                NOT INNER
 1563  50      JJ       592 597      12B         OPT
 1606  905     JJJ      606 608      11B                EXT REFS
 1623  51      II       612 614      17B                NOT INNER
 1633  51      JJ       613 614       3B      INSTACK
 1745  57      II       660 661      11B                EXT REFS
 1757  906     JJJ      669 671      11B                EXT REFS
 1771  45      K        674 677      24B                NOT INNER
 2003  45      L        676 677       7B      INSTACK
 2025  59      K        679 680       7B      INSTACK
 2044  60      K        681 682       7B      INSTACK
 2061  61      K        684 687      24B                NOT INNER
 2073  61      L        686 687       7B      INSTACK
 2115  62      K        689 690       7B      INSTACK
 2133  68      K        694 695      11B                EXT REFS
 2154  82      II       703 705      12B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       FLPCOM    14400 ECS          0 GKECS   (3200)          3200 SOLECS  (8000)          11200 AECS    (3200)
       KZERO        16              0 KO      (1)                1 XK      (15)
       COMA         41              0 LC      (40)              40 BR      (1)
       FLEXT      3242              0 GK      (3200)          3200 OMG     (40)             3240 RHO     (1)
                                 3241 VB      (1)
       MODD       8041              0 Q       (3200)          3200 DETAD   (3200)           6400 WW      (1600)
                                 8000 OMM     (40)            8040 NC      (1)
       FITR         41              0 NOMI    (1)                1 NIND    (40)
       FLUTB        27              0 V       (25)              25 NV      (1)                26 DV      (1)
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COMMON BLOCKS  LENGTH   MEMBERS - BIAS NAME(LENGTH)
   FLUTV          7            0 V1     (1)          1 V2     (1)          2 FLO    (1)
                               3 FHI    (1)          4 IE     (1)          5 NQZ    (1)
                               6 NVTOT  (1)
   FACE           6            0 SCALE  (1)          1 FACT   (1)          2 PROD   (1)
                               3 EM     (1)          4 ROWS   (1)          5 VELOC  (1)
   DETAIL         2            0 EPS    (1)          1 LVEC   (1)
   CTAPES        50            0 ITAPES (50)
   FLUT         244            0 VECC   (80)        80 VECR   (80)       160 VELEQ  (1)
                             161 FRQSQ  (1)        162 C      (1)        163 NMODE  (1)
                             164 IDMODE (80)
   KLUES         24            0 KLUSE  (1)          1 KLUNAL (1)          2 IRED   (1)
                               3 KLUMD  (1)          4 KLUBAL (1)          5 MSADD  (1)
                               6 NPAS   (1)          7 IDNOPT (1)          8 VDES   (1)
                               9 EPS1   (1)         10 DWMAX  (1)         11 NBAR   (1)
                              12 NFIX   (1)         13 D      (1)         14 DEL    (1)
                              15 EPS2   (1)         16 NCYC   (1)         17 NNN    (1)
                              18 IBAND  (1)         19 IFIN   (1)         20 KLUB   (1)
                              21 KLUQ   (1)         22 MORBAL (1)         23 DBAL   (1)
   CLIST         11            0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                               3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                               6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                               9 KOUNTH (1)         10 KOUNTI (1)
   CTABLE         8            0 KTABLE (1)          1 NPASS  (1)          2 NROWS  (1)
                               3 NCOLS  (1)          4 NCOLST (1)          5 KTABLO (1)
                               6 NPAGEA (1)          7 ITAPET (1)
   CONSTS         2            0 NO     (1)          1 YES    (1)
   STORES       277            0 NUMSTR (1)          1 KCONST (1)          2 ISTDOF (30)
                              32 IDYDOF (30)        62 IDSTR  (5)         67 STRWI  (5)
                              72 STRWO  (5)         77 STRWN  (5)         82 STRII  (15)
                              97 STRIO  (15)       112 STRIN  (15)       127 STRRI  (15)
                             142 STRRO  (15)       157 STRRN  (15)       172 STRWDO (5)
                             177 STRWDN (5)        182 STRIDO (15)       197 STRIDN (15)
                             212 STRRDO (15)       227 STRRDN (15)       242 SCAALE (35)
   STRCLU        10            0 ICYCLE (1)          1 ISTEP  (1)          2 M1     (1)
                               3 M2     (1)          4 M3     (1)          5 M4     (1)
                               6 VS     (1)          7 VOLD   (1)          8 VNEW   (1)
                               9 STPOLD (1)
   VSAVE          2            0 VNSAVE (1)          1 VOSAVE (1)

EQUIV CLASSES  LENGTH   MEMBERS - BIAS NAME(LENGTH)
   STOR        9600            0 SOL    (8000)       0 SOLV   (8000)       0 A      (3200)
                               0 AA     (3200)    3200 B      (3200)    6400 FF     (3200)

STATISTICS
  PROGRAM LENGTH                42421B   17681
  CM LABELED COMMON LENGTH      27423B   12051
  ECS LABELED COMMON LENGTH     34100B   14400
          56400B CM USED
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      SUBROUTINE ZANLYN (F,EPS,NSIG,NGUESS,N,X,ITMAX,INFER,IER)         ZANLYN     2
C                                                                       ZANLYN     3
C     MODIFIED IMSL ROUTINE AS ALTERNATIVE TO ZERO                      ZANLYN     4
C     F         FUNCTION SUBROUTINE WRITTEN BY USER                     ZANLYN     5
C     EPS       FIRST STOPPING CRITERION , A ROOT Z IS ACCEPTED IF      ZANLYN     6
C               ABS(F(Z)) .LE. EPS                                      ZANLYN     7
C     NSIG      SECOND STOPPING CRITERION , A ROOT IS ACCEPTED IF IN TWO ZANLYN    8
C               SUCCESSIVE APPROXIMATIONS TO A GIVEN ROOT , AGREEMENT IS ZANLYN    9
C               IN FIRST SIG DIGITS                                     ZANLYN    10
C     NGUESS    NUMBER OF INITIAL ESTIMATES OF ROOTS                    ZANLYN    11
C     N         NUMBER OF ROOTS TO BE FOUND                             ZANLYN    12
C               IF NEGATIVE PRINT OUTPUT OF ITERATION OCCURS            ZANLYN    13
C     ITMAX     MAXIMUM NUMBER OF ITERATIONS PER ROOT                   ZANLYN    14
C     INFER     ARRAY OF NUMBER OF ITERATIONS PER ROOT                  ZANLYN    15
C     IER       ERROR PARAMETER (OUTPUT)                                ZANLYN    16
C               WARNING ERROR = 32 + N                                  ZANLYN    17
C                N = 1  FAILURE TO CONVERGE WITHIN ITMAX ITERATIONS FOR ZANLYN    18
C                ONE OF N ROOTS TO BE FOUND                             ZANLYN    19
      COMPLEX    X(1) , ONE , D , DD , DEN , DI , FRT , F , G           ZANLYN    20
      COMPLEX    H , RT , T1 , T2 , T3 , TEM , XO , X1 , X2 , BI , XX   ZANLYN    21
      COMPLEX HSTART                                                    ZANLYN    22
      DIMENSION        NAME(2)                                          ZANLYN    23
      DIMENSION ITAPES(50)                                              ZANLYN    24
      DIMENSION     INFER(1)                                            ZANLYN    25
C                                                                       ZANLYN    26
      COMMON /FACE/ SCALE , FACT , PROD , EM , ROWS , VELOC             ZANLYN    27
      COMMON /CTAPES/  ITAPES                                           ZANLYN    28
C                                                                       ZANLYN    29
C                                                                       ZANLYN    30
      DATA  NAME/4HZANL,4HYN  /                                         ZANLYN    31
      DATA SKIP/4HO   /                                                 ZANLYN    32
      SIZE(ZI)  =  ABS(REAL(ZI)) + ABS(AIMAG(ZI))                       ZANLYN    33
      ITAPEW =  ITAPES(6)                                               ZANLYN    34
      MM  =  IABS (N)                                                   ZANLYN    35
      DO 500  III = 1,MM                                                ZANLYN    36
  500 INFER(III)  =  0                                                  ZANLYN    37
      IER       =  0                                                    ZANLYN    38
      ONE       =  (1.0 , 0.0)                                          ZANLYN    39
      EPS1      =  10.0**(-NSIG)                                        ZANLYN    40
      ICONJ     =  0                                                    ZANLYN    41
      SCALE     =  1.0                                                  ZANLYN    42
      PROD      =  1.0                                                  ZANLYN    43
      FACT      =  1.0                                                  ZANLYN    44
      LO        =  0                                                    ZANLYN    45
      L         =  1                                                    ZANLYN    46
      IF ( N .LT. 0 )    WRITE (ITAPEW,200)  VELOC                      ZANLYN    47
    5 JK        =  0                                                    ZANLYN    48
      HSTART = CMPLX(0.1*REAL(X(L)),0.0)                                ZANLYN    49
      QZ        =  SIZE (X(L))                                          ZANLYN    50
      IF ( QZ .LE. 1.E-15 )        GO TO 25                             ZANLYN    51
   10 H = - HSTART                                                      ZANLYN    52
      RT = X(L) + H                                                     ZANLYN    53
      ASSIGN 15 TO NN                                                   ZANLYN    54
      GO TO 135                                                         ZANLYN    55
   15 XO        =  FRT                                                  ZANLYN    56
      L1        =  L                                                    ZANLYN    57
      L11       =  L1/2 + 1                                             ZANLYN    58
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```
      IF ( N .LT. O )    WRITE (ITAPEW,300)  L11 , SKIP , RT , XO         ZANLYN   59
      H = 2.0 * HSTART                                                    ZANLYN   60
      RT = RT + H                                                         ZANLYN   61
      ASSIGN 20 TO NN                                                     ZANLYN   62
      GO TO 135                                                           ZANLYN   63
   20 X1         =  FRT                                                   ZANLYN   64
      IF ( N .LT  O )    WRITE (ITAPEW,400)  JK , RT , X1 , H             ZANLYN   65
      H = - HSTART                                                        ZANLYN   66
      RT = RT + H                                                         ZANLYN   67
      ASSIGN 40 TO NN                                                     ZANLYN   68
      GO TO 135                                                           ZANLYN   69
C                                                                         ZANLYN   70
   25 RT         =  -ONE                                                  ZANLYN   71
      ASSIGN 30 TO NN                                                     ZANLYN   72
      GO TO 135                                                           ZANLYN   73
   30 XO         =  FRT                                                   ZANLYN   74
      RT         =  ONE                                                   ZANLYN   75
      ASSIGN 35 TO NN                                                     ZANLYN   76
      GO TO 135                                                           ZANLYN   77
   35 X1         =  FRT                                                   ZANLYN   78
      RT         =  0.0                                                   ZANLYN   79
      HSTART = ONE                                                        ZANLYN   80
      H = - ONE                                                           ZANLYN   81
      ASSIGN 40 TO NN                                                     ZANLYN   82
      GO TO 135                                                           ZANLYN   83
   40 X2         =  FRT                                                   ZANLYN   84
      IF ( N .LT. O )    WRITE (ITAPEW,400)  JK , RT , X2 , H             ZANLYN   85
   45 D       =  (-0.5,0.0)                                               ZANLYN   86
      H = -HSTART                                                         ZANLYN   87
C                       BEGIN MAIN ALGORITHM                              ZANLYN   88
   50 DD         =  D + ONE                                               ZANLYN   89
      T1         =  XO * D * D                                            ZANLYN   90
      T2         =  X1 * DD * DD                                          ZANLYN   91
      XX         =  X2 * DD                                               ZANLYN   92
      T3         =  X2 * D                                                ZANLYN   93
      BI         =  T1 - T2 + XX + T3                                     ZANLYN   94
      DEN        =  BI*BI - 4.0*(XX*T1-T3*(T2-XX))                        ZANLYN   95
C                   USE DENOMINATOR OF MAXIMUM AMPLITUDE                  ZANLYN   96
      T1         =  CSQRT (DEN)                                           ZANLYN   97
      T2         =  BI + T1                                               ZANLYN   98
      T3         =  BI - T1                                               ZANLYN   99
      QZ         =  SIZE(T2) - SIZE(T3)                                   ZANLYN  100
      IF ( QZ .GE. O )        GO TO 60                                    ZANLYN  101
   55 DEN        =  T3                                                    ZANLYN  102
      GO TO 65                                                            ZANLYN  103
   60 DEN        =  T2                                                    ZANLYN  104
C                   TEST FOR ZERO DENOMINATOR                             ZANLYN  105
   65 QZ         =  SIZE (DEN)                                            ZANLYN  106
      IF ( QZ .GT. 1.E-15 )        GO TO 75                               ZANLYN  107
   70 DEN        =  ONE                                                   ZANLYN  108
   75 DI         =  -2.0 * XX / DEN                                       ZANLYN  109
      H          =  DI * H                                                ZANLYN  110
      RT         =  RT + H                                                ZANLYN  111
C                   CHECK CONVERGENCE OF THE FIRST KIND                   ZANLYN  112
      QZ         =  SIZE (H/RT)                                           ZANLYN  113
      IF ( QZ .LE. EPS1 )     GO TO 100                                   ZANLYN  114
   80 ASSIGN 85 TO NN                                                     ZANLYN  115
```

```
            GO TO 135                                                    ZANLYN     116
         85 QZ        =  SIZE(FRT) - SIZE(10.0*X2)                       ZANLYN     117
            IF ( QZ .LT. 0.0 )       GO TO 95                            ZANLYN     118
      C                   TAKE REMEDIAL ACTION TO                        ZANLYN     119
      C                   INDUCE CONVERGENCE                             ZANLYN     120
         90 DI        =  DI * 0.5                                        ZANLYN     121
            H         =  H * 0.5                                         ZANLYN     122
            RT        =  RT - H                                          ZANLYN     123
            GO TO 135                                                    ZANLYN     124
         95 XO        =  X1                                              ZANLYN     125
            X1        =  X2                                              ZANLYN     126
            X2        =  FRT                                             ZANLYN     127
            D         =  DI                                              ZANLYN     128
            GO TO 50                                                     ZANLYN     129
      C                   A ROOT HAS BEEN FOUND                          ZANLYN     130
        100 CALL ASSESS (FRT, F, X, LO, RT, 2)                           ZANLYN     131
        105 X(L)      =  RT                                              ZANLYN     132
            JK        =  JK + 1                                          ZANLYN     133
            IF ( N .LT. O .AND. JK .GT. 3 )                              ZANLYN     134
           1         WRITE (ITAPEW,400 )  JK , RT , FRT , H              ZANLYN     135
            INFER(L)  = JK                                               ZANLYN     136
            L         =  L + 1                                           ZANLYN     137
            LO        =  L                                               ZANLYN     138
            X(L)      =  CONJG (RT)                                      ZANLYN     139
            L         =  L + 1                                           ZANLYN     140
            IF (L-MM)  5,5,185                                           ZANLYN     141
        135 JK        =  JK + 1                                          ZANLYN     142
            IF ( JK .GT. ITMAX )     GO TO 180                           ZANLYN     143
            CALL ASSESS (FRT, F, X, LO, RT, 2)                           ZANLYN     144
            IF ( JK .GE. 2 )         GO TO 2                             ZANLYN     145
            SCALE     =  1.0 / SIZE (FRT)                                ZANLYN     146
            FRT       =  SCALE * FRT                                     ZANLYN     147
            IF ( LO .EQ. O )         GO TO 120                           ZANLYN     148
            FACT      =  FACT / PROD**(1.0/FLOAT(LO))                    ZANLYN     149
        120 ROWS      =  ROWS * (SCALE/PROD)**(1.0/EM)                   ZANLYN     150
          2 IF ( N .LT. O .AND. JK .GT. 3 )                              ZANLYN     151
           1         WRITE (ITAPEW,400 )  JK , RT , FRT , H              ZANLYN     152
            QZ        =  SIZE (FRT)                                      ZANLYN     153
            IF ( QZ .GE. EPS )       GO TO 170                           ZANLYN     154
            GO TO 105                                                    ZANLYN     155
        170 GO TO NN,(15,20,30,35,40,85)                                 ZANLYN     156
      C                                                                  ZANLYN     157
      C                                                                  ZANLYN     158
      C                   WARNING ERROR , ITMAX = MAXIMUM                ZANLYN     159
        180 IER       =  33                                              ZANLYN     160
            GOTO 100                                                     ZANLYN     161
        185 IF ( IER .EQ. O )        GO TO 9005                          ZANLYN     162
            CALL UERTST (IER,NAME)                                       ZANLYN     163
      C                                                                  ZANLYN     164
      C     FORMATS                                                      ZANLYN     165
      C                                                                  ZANLYN     166
        200 FORMAT (1H1,/ 5X37HOUTPUT FROM SUBROUTINE ZANLYN FOR V =,F12.3 /  ZANLYN     167
           1        7X4HITER,12X13HAPPROXIMATION,23X14HFUNCTION VALUE,   ZANLYN     168
           2        23X9HINCREMENT, /9X3HNO., /)                         ZANLYN     169
        300 FORMAT (2X,I3,2X,A4,3(1PE20.7,E16.7))                        ZANLYN     170
        400 FORMAT (7X,I4,3(1PE20.7,E16.7))                              ZANLYN     171
      C                                                                  ZANLYN     172
```

```
              9005 RETURN                                                     ZANLYN     173
                   END                                                        ZANLYN     174


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  ZANLYN          1          172

VARIABLES       SN  TYPE              RELOCATION
  651  BI           COMPLEX                          REFS        20      2*94       97        98   DEFINED        93
  613  D            COMPLEX                          REFS        19        88     2*89        92   DEFINED        85       127
  615  DD           COMPLEX                          REFS        19      2*90       91   DEFINED        88
  617  DEN          COMPLEX                          REFS        19        96    2*105       108   DEFINED        94       101
                                                      103       107
  621  DI           COMPLEX                          REFS        19       109      120       127   DEFINED       108       120
    3  EM           REAL                  FACE       REFS        26       149
    O  EPS          REAL                   F.P.      REFS       153   DEFINED        1
  662  EPS1         REAL                             REFS       113   DEFINED       39
    O  F            COMPLEX                F.P.      REFS        19       130      143   DEFINED         1
    1  FACT         REAL                  FACE       REFS        26       148  DEFINED        43       148
  623  FRT          COMPLEX                          REFS        19        55       63        73        77        83     2*116
                                                      126       130       133      143     2*145       146       150     2*152
                                                  DEFINED       146
  625  G          * COMPLEX    *UNDEF                REFS        19
  627  H            COMPLEX                          REFS        20        52       60        64        66        84       109
                                                      110     2*112       121      122       133       150
                                                  DEFINED        51        59       65        80        86       109       121
  655  HSTART       COMPLEX                          REFS        21        51       59        65        86
                                                  DEFINED        48        79
  663  ICONJ      * INTEGER                       DEFINED        40
    O  IER          INTEGER                F.P.      REFS       161       162  DEFINED         1        37       159
  661  III          INTEGER                          REFS        36   DEFINED       35
    O  INFER        INTEGER    ARRAY       F.P.      REFS        24   DEFINED        1        36       135
    O  ITAPES       INTEGER    ARRAY     CTAPES      REFS        23        27       33
  657  ITAPEW       INTEGER                       DEFINED        33  I/O REFS       46        58        64        84       133
                                                      150
    O  ITMAX        INTEGER                F.P.      REFS       142   DEFINED        1
  666  JK           INTEGER                          REFS        64        84      132     2*133       135       141       142
                                                      144     2*150   DEFINED       47       132       141
  665  L            INTEGER                          REFS        48      2*49       52        56       131       135       136
                                                      137       138       139      140   DEFINED        45       136       139
  664  LO           INTEGER                          REFS       130       143      147       148   DEFINED        44       137
  671  L1           INTEGER                          REFS        57   DEFINED       56
  672  L11          INTEGER                          REFS        58   DEFINED       57
  660  MM           INTEGER                          REFS        35       140  DEFINED        34
    O  N            INTEGER                F.P.      REFS        34        46       58        64        84       133       150
                                                  DEFINED         1
  673  NAME         INTEGER    ARRAY                 REFS        22       162  DEFINED        30
    O  NGUESS       INTEGER    *UNUSED     F.P.   DEFINED         1
  670  NN           INTEGER                          REFS       155   DEFINED       53        61        67        71        75
                                                       81       114
    O  NSIG         INTEGER                F.P.      REFS        39   DEFINED        1
  611  ONE          COMPLEX                          REFS        19        70       74        79        80        88       107
```

```
VARIABLES      SN  TYPE            RELOCATION
                                             DEFINED      38
    2  PROD       REAL               FACE       REFS      26       148      149   DEFINED      42
  667  QZ         REAL                          REFS      50       100      106      113      117      153
                                             DEFINED      49        99      105      112      116      152
    4  ROWS       REAL               FACE       REFS      26       149   DEFINED      149
  631  RT         COMPLEX                       REFS      20        58       60       64       66       84      110
                                               2*112     122       130      131      133      138      143      150
                                             DEFINED      52        60       66       70       74       78      110
                                                 122
    0  SCALE      REAL               FACE       REFS      26       146      149   DEFINED      41      145
  502  SKIP       REAL                          REFS      58   DEFINED       31
  641  TEM      * COMPLEX   *UNDEF              REFS      20
  633  T1         COMPLEX                       REFS      20        93       94       97       98
                                             DEFINED      89        96
  635  T2         COMPLEX                       REFS      20        93       94     2*99      103
                                             DEFINED      90        97
  637  T3         COMPLEX                       REFS      20        93       94     2*99      101
                                             DEFINED      92        98
    5  VELOC      REAL               FACE       REFS      26        46
    0  X          COMPLEX   ARRAY     F.P.      REFS      19        48     2*49       52      130      143
                                             DEFINED       1       131      138
  653  XX         COMPLEX                       REFS      20        93     2*94      108   DEFINED       91
  643  XO         COMPLEX                       REFS      20        58       89   DEFINED      55       73      124
  645  X1         COMPLEX                       REFS      20        64       90      124   DEFINED       63       77
                                                 125
  647  X2         COMPLEX                       REFS      20        84       91       92    2*116      125
                                             DEFINED      83       126
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       ASSESS                6             130        143
       CSQRT      COMPLEX    1 LIBRARY      96
       UERTST                2             162

INLINE FUNCTIONS   TYPE    ARGS       DEF LINE   REFERENCES
       ABS        REAL       1  INTRIN              2*49      4*99    2*105    2*112    4*116    2*145    2*152
       AIMAG      REAL       1  INTRIN                49      2*99      105      112    2*116      145      152
       CMPLX      COMPLEX    2  INTRIN                48
       CONJG      COMPLEX    1  INTRIN               138
       FLOAT      REAL       1  INTRIN               148
       IABS       INTEGER    1  INTRIN                34
       REAL       REAL       1  INTRIN                48        49     2*99      105      112    2*116      145      152
       SIZE       REAL       1    SF        32        49      2*99      105      112    2*116      145      152

STATEMENT LABELS           DEF LINE    REFERENCES
  442  2                      150        144
   35  5                       47      2*140
    0  10         INACTIVE     51
   54  15                      55         53      155
   74  20                      63         61      155
  111  25                      70         50
  116  30                      73         71      155
  126  35                      77         75      155
  141  40                      83         67       81      155
    0  45         INACTIVE     85
  154  50                      88        128
    0  55         INACTIVE    101
```

```
STATEMENT LABELS             DEF LINE   REFERENCES
  263  60                      103        100
  266  65                      105        102
    0  70         INACTIVE     107
  276  75                      108        106
    0  80         INACTIVE     114
  326  85                      116        114       155
    0  90         INACTIVE     120
  347  95                      124        117
  362  100                     130        113       160
  366  105                     131        154
  436  120                     149        147
  413  135                     141         54        62        68        72        76        82       115       123
  455  170                     155        153
  457  180                     159        142
  461  185                     161        140
  552  200     FMT             166         46
  570  300     FMT             169         58
  574  400     FMT             170         64        84       133       150
    0  500                      36         35
  465  9005                    172        161

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   14  500      III         35 36         2B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       FACE          6               0 SCALE  (1)              1 FACT   (1)              2 PROD   (1)
                                     3 EM     (1)              4 ROWS   (1)              5 VELOC  (1)
       CTAPES       50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                  675B      445
  CM LABELED COMMON LENGTH         70B       56
          52000B CM USED
```

```
      COMPLEX FUNCTION F(Z)
C
C     FUNCTION TO DETERMINE FLUTTER DETERMINANT FOR P-K METHOD
C
      DIMENSION ENT(40), WW(40,40), OMM(40), OMG(40), NIND(40), LC(40)
C
      COMPLEX B(40,40), DETAD(40,40), BB(40,40). QRS(40,40)
      COMPLEX Z, QV, CDET
      COMMON /CTAPES/ ITAPES(50)
      COMMON /COMA  / LC,BR
      COMMON /FLEXT / BB, OMG, RHO, VB
      COMMON / FLUTV / VL, VH, FLO, FHI, IE, NQZ, NVTOT
      COMMON /FACE/ SCALE , FACT , PROD , EM , ROWS , VELOC
      COMMON /FITR  / NOMI, NIND
      COMMON /MODD  / B, DETAD, WW, OMM, NC
C
      ITAPE = ITAPES(50)
      NQ  = LC(2)
      MID = 40
      QV = Z * Z * VB * VB
      VBB       =  AMAX1 (1.E-5,ABS(AIMAG(Z)))
      VBO       =  1.0 / VBB
      CALL QFLIN (ITAPE,VBO,QRS,RHO,O,MID)
      XX        =  RHO * VBO * BR
      XXX       =   XX * VBO * BR
      DO 1 I = 1,NQ
      DO 1 J = 1,NQ
      IF ( AIMAG(Z)  LT. 0.0 )      QRS(I,J) = CONJG(QRS(I,J))
      QRS(I,J)   =   - QRS(I,J) * RHO * (VB * AIMAG(Z))**2
C     ------------------------------------------------------------------
C     --------- ADD STIFFNESS TERMS -----------------------------------
      QRS(I,J)   =  QRS(I,J) + BB(I,J)
     1          + CMPLX(REAL(DETAD(I,J))*XXX,AIMAG(DETAD(I,J))*XX)
C     ------------------------------------------------------------------
C     --------- ADD MASS TERMS ----------------------------------------
    1 QRS(I,J)   = QRS(I,J) + QV * WW(I,J)
C
      IF ( NQZ .NE. NQ )   CALL CONV (NQ,NQZ,NOMI,NIND,QRS)
      DO 3  I = 1,NQZ
      DO 3  J = 1,NQZ
    3 QRS(I,J)   =  QRS(I,J) * ROWS
      F = CDET (QRS,NQZ,MID,ENT,NIX)
      RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
5 F	1	43

VARIABLES	SN TYPE		RELOCATION				
0 B	COMPLEX	ARRAY	MODD	REFS	7	15	
0 BB	COMPLEX	ARRAY	FLEXT	REFS	7	11	32

```
      SUBROUTINE FRORD (NV,NQ,V,SOL,BR,KPNT,VELCR,KCR,MID,KEXT,NVA)
C
C     ORDERING ROUTINE FOR FLUTTER SOLUTION BY EXTRAPOLATION
C
      DIMENSION FRR(40), DRR(40), IORD(40), IPERM(40)
      DIMENSION V(1), VV(3), VOT(3)
      DIMENSION ITAPES(50)
C
      COMPLEX SOL(MID,1), SOLL(40), RLLT, RLT(3)
C
      COMMON/CTAPES/ ITAPES
C
      CONST    =  1.6878 / (BR*6.2832)
      ITAPEW = ITAPES(6)
C
      DO 1   I = 1,NV
      IF ( KEXT .NE. O .AND. I  NE. NVA )    GO TC 1
      IF ( I  GE. 3 )          GO TO 18
      DO 19  J = 1,NQ
   19 FRR(J)  =  AIMAG (SOL(J,I)) * V(I) * CONST
      CALL AORDER ( FRR , NQ , IPERM , 1 )
      DO 20  J = 1,NQ
      JJ        =  IPERM (J)
   20 SOLL(J)  =  SOL (JJ,I)
      DO 21  J = 1,NQ
   21 SOL(J,I)  =  SOLL (J)
      IF ( KEXT .NE. O )       GO TO 500
      GO TO 1
   18 DO 2  J = 1,NQ
    2 SOLL(J)  =  SOL(J,I)
      IF ( I .GT. 3 )     GO TO 100
      DO 3  J = 1,2
      VOT(J)   =  1.0
      DO 3  K = 1,2
      IF ( K .EQ. J )          GO TO 3
      VOT(J)   =  VOT(J) * (V(3)-V(K)) / (V(J)-V(K))
    3 CONTINUE
      DO 13  J = 1,NQ
      DO 16  K = 1,2
      A = AIMAG(SOL(J,K))*V(K)*CONST
      B = REAL(SOL(J,K))/AIMAG(SOL(J,K))
   16 RLT(K) = CMPLX(B,A)
      RLLT      =  CMPLX (0.0,0.0)
      DO 17  K = 1,2
   17 RLLT      =  RLLT + VOT(K) * RLT(K)
      FRR(J) = AIMAG(RLLT)
   13 DRR(J) = REAL(RLLT)
      GO TO 200
  100 KQ        =  I - 4
      DO 4  J = 1,3
      KQ        =  KQ + 1
    4 VV(J)     =  V (KQ)
      DO 6  J = 1,3
      VOT(J)   =  1.0
      DO 6  K = 1,3
      IF ( K .EQ. J )    GO TO 6
      VOT(J)   =  VOT(J) * (V(I)-VV(K)) / (VV(J)-VV(K))
```

```
LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   17  100       I           10 11         11B         OPT

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      FACE            6                 0 SCALE  (1)              1 FACT   (1)              2 PROD   (1)
                                        3 EM     (1)              4 ROWS   (1)              5 VELOC  (1)

STATISTICS
  PROGRAM LENGTH                  66B        54
  CM LABELED COMMON LENGTH         6B         6
        52000B CM USED
```

```
            SUBROUTINE ASSESS (G, FA, ROOT, N, Z, KASES)                      ASSESS      2
            COMPLEX    FA                                                     ASSESS      3
            COMPLEX G                                                         ASSESS      4
            COMPLEX      F,  ROOT,  Z,  WO                                    ASSESS      5
            COMMON /FACE/ SCALE , FACT , PROD , EM , ROWS , VELOC             ASSESS      6
            DIMENSION ROOT (1)                                                ASSESS      7
        101 CONTINUE                                                          ASSESS      8
            G = CMPLX(1.0,0.0)                                                ASSESS      9
            IF (N.EQ.0)  GO TO 110                                            ASSESS     10
            DO 100 I = 1,N                                                    ASSESS     11
        100 G         =  (Z - ROOT(I)) * G * FACT                             ASSESS     12
            IF (ABS(REAL(G)) + ABS(AIMAG(G)).LT.1.0E-40) G=CMPLX(1.0E-40,0.0) ASSESS     13
            PROD      =  ABS(REAL(G)) + ABS(AIMAG(G))                         ASSESS     14
        110 G         =  F(Z) / G                                             ASSESS     15
            RETURN                                                            ASSESS     16
            END                                                               ASSESS     17
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  ASSESS         1           15

VARIABLES      SN  TYPE          RELOCATION
   3  EM           REAL                   FACE         REFS        5
   0  FA           COMPLEX  *UNUSED        F.P.        REFS        2     DEFINED       1
   1  FACT         REAL                   FACE         REFS        5       11
   0  G            COMPLEX                 F.P.        REFS        3       11       2*12       2*13       14
                                                    DEFINED        1        8         11         12       14
  62  I            INTEGER                             REFS       11     DEFINED      10
   0  KASES        INTEGER  *UNUSED        F.P.     DEFINED        1
   0  N            INTEGER                 F.P.        REFS        9       10     DEFINED         1
   2  PROD         REAL                   FACE         REFS        5     DEFINED      13
   0  ROOT         COMPLEX   ARRAY         F.P.        REFS        4        6         11    DEFINED        1
   4  ROWS         REAL                   FACE         REFS        5
   0  SCALE        REAL                   FACE         REFS        5
   5  VELOC        REAL                   FACE         REFS        5
  60  WO         * COMPLEX  *UNDEF                     REFS        4
   0  Z            COMPLEX                 F.P.        REFS        4       11         14    DEFINED        1

EXTERNALS          TYPE     ARGS        REFERENCES
      F            COMPLEX   1              4         14

INLINE FUNCTIONS   TYPE     ARGS         DEF LINE  REFERENCES
      ABS          REAL      1  INTRIN               2*12      2*13
      AIMAG        REAL      1  INTRIN                 12        13
      CMPLX        COMPLEX   2  INTRIN                  8        12
      REAL         REAL      1  INTRIN                 12        13

STATEMENT LABELS             DEF LINE    REFERENCES
   0  100                       11           10
   0  101          INACTIVE      7
  43  110                       14            9
```

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
132	6	I	39 44	22B		NOT INNER
142	6	J	41 44	6B	INSTACK	
155	7	I	45 54	43B		NOT INNER
167	8	J	47 49	5B	INSTACK	
202	9	J	51 52	6B	INSTACK	

STATISTICS
  PROGRAM LENGTH 273B 187
    52000B CM USED

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  RTIN              1        15        31        55

VARIABLES     SN  TYPE            RELOCATION
  225  I          INTEGER                       REFS     2*13    2*14    2*20      22    3*23      28      29
                                                  30       38    2*40      42    3*43      49      53      54
                                             DEFINED       12      19      25      36      39      45
  227  J          INTEGER                       REFS       22    2*23    2*28      42    2*43      49    2*52
                                             DEFINED       21      27      41      47      51
    0  K          INTEGER              F.P.     REFS        9    2*11      13      16      18      20      23
                                                  35       40      43      46  DEFINED       1
  226  KK         INTEGER                       REFS       19      21      27  DEFINED      18
  230  KQ         INTEGER                       REFS       37      38      48      49  DEFINED      35      37
                                                  46       48
    0  LINP       INTEGER              F.P.     REFS        9  DEFINED       1
    0  MID        INTEGER              F.P.     REFS        6  DEFINED       1
    0  N          INTEGER              F.P.     REFS       12      25      45  DEFINED       1
  222  RLLT       COMPLEX                       REFS        7      28      29      30      52      53      54
                                             DEFINED       26      28      50      52
  241  RLT        COMPLEX    ARRAY              REFS        6      52  DEFINED      49
    0  ROOT       COMPLEX    ARRAY     F.P.     REFS        6      14  DEFINED       1      13      14      29
                                                  30       53      54
    0  SOL        COMPLEX    ARRAY     F.P.     REFS        6      13      28      49  DEFINED       1
    0  V          REAL       ARRAY     F.P.     REFS        5    2*11    2*20    4*23      38      40      43
                                             DEFINED        1
  235  VOT        REAL       ARRAY              REFS        5      23      28      43      52
                                             DEFINED       20      23      40      43
  231  VV         REAL       ARRAY              REFS        5      40    3*43  DEFINED      38
  224  VVO        REAL                          REFS       13  DEFINED      11

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       CMPLX      COMPLEX   2  INTRIN                26       50
       CONJG      COMPLEX   1  INTRIN                14       30      54

STATEMENT LABELS             DEF LINE   REFERENCES
    0  1                         14         12
   62  2                         24         19       21       22
    0  3                         30         25
    0  4                         28         27
    0  5                         38         36
  147  6                         44         39       41       42
    0  7                         54         45
    0  8                         49         47
    0  9                         52         51
   37  10                        16          9
  116  100                       35         16

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   31  1        I          12 14         5B     INSTACK
   44  2        I          19 24        23B                NOT INNER
   55  2        J          21 24         6B     INSTACK
   70  3        I          25 30        25B                NOT INNER
  100  4        J          27 28         5B     INSTACK
  125  5        I          36 38         3B     INSTACK
```

```
      SUBROUTINE RTIN (N,SOL,ROOT,K,V,MID,LINP)                         RTIN   2
C                                                                       RTIN   3
C     ROOT PREDICTOR ROUTINE USING LAGRANGIAN INTERPOLATION             RTIN   4
C                                                                       RTIN   5
      DIMENSION         V(1) ,          VV(4) ,        VOT(4)           RTIN   6
      COMPLEX       SOL(MID,1) ,      ROOT(1) ,        RLT(4)           RTIN   7
      COMPLEX           RLLT                                            RTIN   8
C                                                                       RTIN   9
      IF ( K .GT  2 .AND. LINP .NE. 0 )      GO TO 10                   RTIN  10
C              ONE KNOWN SET OF ROOTS                                   RTIN  11
      VVO      =  V(K-1) / V(K)                                         RTIN  12
      DO 1  I = 1,N                                                     RTIN  13
      ROOT(2*I-1)  =  VVO * SOL(I,K-1)                                  RTIN  14
    1 ROOT(2*I)     =  CONJG (ROOT(2*I-1))                              RTIN  15
      RETURN                                                            RTIN  16
   10 IF ( K .GT. 5 )         GO TO 100                                 RTIN  17
C              UP TO FOUR KNOWN SETS OF ROOTS                           RTIN  18
      KK       =  K - 1                                                 RTIN  19
      DO 2  I = 1,KK                                                    RTIN  20
      VOT(I)   =  V(I) / V(K)                                           RTIN  21
      DO 2  J = 1,KK                                                    RTIN  22
      IF ( J .EQ. I )         GO TO 2                                   RTIN  23
      VOT(I)   =  VOT(I) * (V(K)-V(J)) / (V(I)-V(J))                    RTIN  24
    2 CONTINUE                                                          RTIN  25
      DO 3  I = 1,N                                                     RTIN  26
      RLLT     =  CMPLX (0.0,0.0)                                       RTIN  27
      DO4   J = 1,KK                                                    RTIN  28
    4 RLLT     =  RLLT + VOT(J) * SOL(I,J)                              RTIN  29
      ROOT(2*I-1)   =  RLLT                                             RTIN  30
    3 ROOT(2*I)     =  CONJG (RLLT)                                     RTIN  31
      RETURN                                                            RTIN  32
C              MORE THAN FOUR KNOWN SETS OF ROOTS                       RTIN  33
C              RESTRICTION TO CUBIC FIT                                 RTIN  34
C                                                                       RTIN  35
  100 KQ       =  K - 5                                                 RTIN  36
      DO 5  I = 1,4                                                     RTIN  37
      KQ       =  KQ + 1                                                RTIN  38
    5 VV(I)    =  V(KQ)                                                 RTIN  39
      DO 6  I = 1,4                                                     RTIN  40
      VOT(I)   =  VV(I) / V(K)                                          RTIN  41
      DO 6  J = 1,4                                                     RTIN  42
      IF ( J .EQ. I )         GO TO 6                                   RTIN  43
      VOT(I)   =  VOT(I) * (V(K)-VV(J)) / (VV(I)-VV(J))                 RTIN  44
    6 CONTINUE                                                          RTIN  45
      DO 7  I = 1,N                                                     RTIN  46
      KQ       =  K - 5                                                 RTIN  47
      DO 8  J = 1,4                                                     RTIN  48
      KQ       =  KQ + 1                                                RTIN  49
    8 RLT(J)   =  SOL (I,KQ)                                            RTIN  50
      RLLT     =  CMPLX (0.0,0.0)                                       RTIN  51
      DO 9  J = 1,4                                                     RTIN  52
    9 RLLT     =  RLLT + VOT(J) * RLT(J)                                RTIN  53
      ROOT(2*I-1)   =  RLLT                                             RTIN  54
    7 ROOT(2*I)     =  CONJG (RLLT)                                     RTIN  55
      RETURN                                                            RTIN  56
      END                                                               RTIN  57
```

```
VARIABLES     SN  TYPE           RELOCATION
   56  WARF       INTEGER                         REFS       6        7        23
   55  WARN       INTEGER                         REFS       6        7        15
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS             DEF LINE   REFERENCES
   13  5                        19         15
   17  10                       23         19
   23  15                       28         23
   24  20                       30         18        22        26
   43  25       FMT             33         32

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50                0 ITAPES (50)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       IBIT          4                0 WARN    (1)              1 WARF    (1)              2 TERM    (1)

STATISTICS
  PROGRAM LENGTH                 105B       69
  CM LABELED COMMON LENGTH        62B       50
         52000B CM USED
```

```
                  SUBROUTINE UERTST (IER,NAME)                                      UERTST      2
            C                                                                       UERTST      3
                  DIMENSION ITAPES(50),NAME(2)                                      UERTST      4
                  DIMENS'ON     ITYP(5,4)   ,   IBIT(4)                             UERTST      5
                  COMMON /CTAPES / ITAPES                                           UERTST      6
                  INTEGER        WARN , WARF , TERM                                 UERTST      7
                  EQUIVALENCE    (IBIT(1),WARN),(IBIT(2),WARF),(IBIT(3),TERM)       UERTST      8
                  DATA ITYP  /4HWARN,4HING ,4H    ,4H    ,4H    ,                   UERTST      9
                 1               4HWARN,4HING(,4HWITH,4H FIX,4H    ,                UERTST     10
                 2               4HTERM,4HINAL,4H    ,4H    ,4H    ,                UERTST     11
                 3               4HNON-,4HDEFI,4HNED ,4H    ,4H    /                UERTST     12
                  DATA  IBIT /32,64,128,0/                                          UERTST     13
                  ITAPEW  =  ITAPES(6)                                              UERTST     14
                  IER2     =  IER                                                   UERTST     15
                  IF ( IER2 .GE. WARN )   GO TO 5                                   UERTST     16
            C                  NON - DEFINED                                        UERTST     17
                  IER1     =  4                                                     UERTST     18
                  GO TO 20                                                          UERTST     19
                5 IF ( IER2 .LT. TERM )   GO TO 10                                  UERTST     20
            C                  TERMINAL                                             UERTST     21
                  IER1     =  3                                                     UERTST     22
                  GO TO 20                                                          UERTST     23
               10 IF ( IER2 .LT. WARF )   GO TO 15                                  UERTST     24
            C                  WARNING (WITH FIX)                                   UERTST     25
                  IER1     =  2                                                     UERTST     26
                  GO TO 20                                                          UERTST     27
            C                  WARNING                                              UERTST     28
               15 IER1     =  1                                                     UERTST     29
            C                  EXTRACT 'N'                                          UERTST     30
               20 IER2     =  IER2 - IBIT(IER1)                                     UERTST     31
            C                  PRINT ERROR MESSAGE                                  UERTST     32
                  WRITE (ITAPEW,25)  (ITYP(I,IER1),I=1,5) , NAME , IER2             UERTST     33
               25 FORMAT (2X,20H*** IMSL(UERTST) ***,5A4,4X,2A4,4X,I2)              UERTST     34
                  RETURN                                                            UERTST     35
                  END                                                               UERTST     36
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  UERTST        1           34

VARIABLES       SN  TYPE          RELOCATION
   54  I            INTEGER                         REFS        32   DEFINED      32
   55  IBIT         INTEGER    ARRAY                REFS         4       3*7      30   DEFINED       12
    0  IER          INTEGER             F.P.        REFS        14   DEFINED       1
   53  IER1         INTEGER                         REFS        30        32  DEFINED       17        21        25        28
   52  IER2         INTEGER                         REFS        15        19      23        30        32
                                                 DEFINED        14        30
    0  ITAPES       INTEGER    ARRAY    CTAPES      REFS         3         5      13
   51  ITAPEW       INTEGER                      DEFINED        13  I/O REFS      32
   61  ITYP         INTEGER    ARRAY                REFS         4        32  DEFINED        8
    0  NAME         INTEGER    ARRAY    F.P.        REFS         3        32  DEFINED        1
   57  TERM         INTEGER                         REFS         6         7      19
```

```
INLINE FUNCTIONS   TYPE     ARGS        DEF LINE  REFERENCES
       ABS         REAL       1  INTRIN              2*34       38       2*45      2*58
       AIMAG       REAL       1  INTRIN                34       45         58
       AMAX1       REAL       0  INTRIN                34       45
       CAP         REAL       1    SF        16        34       45         58
       IABS        INTEGER    1  INTRIN                20     3*85       3*97
       IFOOL       INTEGER    3    SF        17        85       97
       REAL        REAL       1  INTRIN                34       45         58

STATEMENT LABELS                DEF LINE   REFERENCES
    0  100          INACTIVE       22          21
   16  110                         24        2*21
   20  120                         25          23
    0  130          INACTIVE       27
    0  133                         35          33
    0  135          INACTIVE       37          36
    0  136                         39          31
    0  140                         47          44
    0  150          INACTIVE       54        2*53
  110  160                         55          53
    0  170          INACTIVE       58        2*57
    0  180          INACTIVE       60          59
  135  189                         62          57        2*59
    0  190                         64          51
    0  230          INACTIVE       66          65
    0  240          INACTIVE       70          69
    0  250                         78          71
  202  260                         80        2*69
    0  270          INACTIVE       82        2*81
    0  280                         87          83
  231  290                         88          81
    0  300                         91          40
    0  310          INACTIVE       93        2*92
    0  320                         99          95
  266  330                        101          92
  267  340                        102         105
  270  350                        103        2*36        2*65

LOOPS  LABEL    INDEX       FROM-TO     LENGTH     PROPERTIES
   32   136     K1           31 39        24B                    EXITS    NOT INNER
   40   133     KJ           33 35         6B       INSTACK
   57   300     K1           40 91       161B                 EXT REFS     EXITS    NOT INNER
   67   140     IK           44 47         6B       INSTACK
  103   190     IK           51 64        36B                 EXT REFS
  165   250     KJ           71 78        13B         OPT
  220   280     IK           83 87        10B         OPT
  253   320     KK           95 99        10B         OPT

EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      L1              1                 0 EL      (1)

STATISTICS
  PROGRAM LENGTH                 405B      261
          52000B CM USED
```

```
ENTRY POINTS      DEF LINE      REFERENCES
   5  CDET             1          102

VARIABLES      SN  TYPE            RELOCATION
    O  A          COMPLEX    ARRAY      F.P.        REFS       13      14    2*34    2*45      55    2*56    2*58
                                                      74       75      82      86      98 DEFINED       1      56
                                                      75       76      86
  320  CDET       COMPLEX                        DEFINED      100     104
  331  D          REAL                              REFS       79      92      93 DEFINED      22      24      79
  327  DELTA      REAL                              REFS       25 DEFINED      19
  357  EL         REAL                              REFS       15      68
    O  ENT        REAL       ARRAY      F.P.        REFS       14      45      58      66      67
                                                 DEFINED        1      38      67      68
  332  EPS        REAL                              REFS     2*26      48 DEFINED      25      26
  340  G          REAL                              REFS       34      36      38      45      48      59      65
                                                      68  DEFINED      32      34      42      45      49      60
                                                      66
  324  H          COMPLEX                           REFS       13      76      86      98     100
                                                 DEFINED       74      82      93      98
  342  I          INTEGER                           REFS       45      46 DEFINED      43      46
  343  IK         INTEGER                           REFS     2*45      55      56    2*58      84    2*85
                                                 DEFINED       44      51      83
  355  IKD        INTEGER                           REFS       85    2*86 DEFINED      84      85
  326  IZERO      INTEGER                           REFS       72      73      84      96 DEFINED      18
  345  I1         INTEGER                           REFS       52      54      56      58      61      63
                                                 DEFINED       50      63
  346  J          INTEGER                           REFS       53      57 DEFINED      52
  334  KB         INTEGER                           REFS       44      51      56      88      89
                                                 DEFINED       28      88
  341  KJ         INTEGER                           REFS     2*34      72 DEFINED      33      71
  352  KJD        INTEGER                           REFS       74      75 DEFINED      72
  333  KK         INTEGER                           REFS       80      82      96    2*97 DEFINED      27      89
                                                      95
  356  KKD        INTEGER                           REFS       97      98 DEFINED      96      97
  354  KK1        INTEGER                           REFS       81      83    2*85 DEFINED      80
  337  K1         INTEGER                           REFS       33      38      52      67      68      69      71
                                                      89      103 DEFINED      31      40
  347  L          INTEGER                           REFS       56 DEFINED      54
  336  LAST       INTEGER                           REFS       33      71      95    2*97 DEFINED      30
  351  LJ         INTEGER                           REFS       73      77 DEFINED      70      77
  353  LJD        INTEGER                           REFS       75      76 DEFINED      73
  357  L1         INTEGER                           REFS       15      66      67      69      70      95    2*97
                                                 DEFINED       61      94
    O  M          INTEGER               F.P.        REFS       20      21 DEFINED       1
    O  MID        INTEGER               F.P.        REFS       30      33      56      71      77      88      90
                                                      94  DEFINED       1
  330  N          INTEGER                           REFS       29      30      31      40 DEFINED      20
    O  NIX        INTEGER               F.P.     DEFINED        1     101     103
  335  NK         INTEGER                           REFS       44      51      81      83    2*85      90
                                                 DEFINED       29      90
  350  P          REAL                              REFS       59      60 DEFINED      58
  322  SUM        COMPLEX                           REFS       10      56 DEFINED      55
  344  TOL        REAL                              REFS       65 DEFINED      48

EXTERNALS           TYPE     ARGS         REFERENCES
       ANDOR      REAL        3               68
       COMSCA     COMPLEX     6               13       56
```

```
  170 P = CAP(A(IK)) * ENT(I1)                                  CDET      59
      IF (P-G) 189,189,180                                      CDET      60
  180 G = P                                                     CDET      61
      L1 = I1                                                   CDET      62
  189 CONTINUE                                                  CDET      63
      I1     =  I1 + 1                                          CDET      64
  190 CONTINUE                                                  CDET      65
      IF (G - TOL) 350,350,230                                  CDET      66
  230 G = ENT(L1)                                               CDET      67
      ENT(L1) = ENT(K1)                                         CDET      68
      ENT(K1)  =  ANDOR(EL, G, 1)                               CDET      69
      IF (L1 - K1) 260,260,240                                  CDET      70
  240 LJ = L1                                                   CDET      71
      DO 250  KJ = K1,LAST,MID                                  CDET      72
      KJD = KJ + IZERO                                          CDET      73
      LJD = LJ + IZERO                                          CDET      74
      H = A(KJD)                                                CDET      75
      A(KJD) = A(LJD)                                           CDET      76
      A(LJD) = H                                                CDET      77
      LJ     =  LJ + MID                                        CDET      78
  250 CONTINUE                                                  CDET      79
      D = -D                                                    CDET      80
  260 KK1 = KK + 1                                              CDET      81
      IF (KK1 - NK) 270,270,290                                 CDET      82
  270 H = -A(KK)                                                CDET      83
      DO 280  IK = KK1,NK                                       CDET      84
      IKD = IK + IZERO                                          CDET      85
      IKD = IKD + IFOOL(IK,KK1,NK)                              CDET      86
      A(IKD) = A(IKD)/H                                         CDET      87
  280 CONTINUE                                                  CDET      88
  290 KB = KB + MID                                             CDET      89
      KK = KB + K1                                              CDET      90
      NK = NK + MID                                             CDET      91
  300 CONTINUE                                                  CDET      92
      IF (D) 310,330,310                                        CDET      93
  310 H = D                                                     CDET      94
      L1 = MID + 1                                              CDET      95
      DO 320  KK = 1,LAST,L1                                    CDET      96
      KKD = KK + IZERO                                          CDET      97
      KKD = KKD + IFOOL(KK,LAST,L1)                             CDET      98
      H    = H * A(KKD)                                         CDET      99
  320 CONTINUE                                                  CDET     100
      CDET = H                                                  CDET     101
  330 NIX = 0                                                   CDET     102
  340 RETURN                                                    CDET     103
  350 NIX = -K1                                                 CDET     104
      CDET = (0.,0.)                                            CDET     105
      GO TO 340                                                 CDET     106
      END                                                       CDET     107
```

SYMBOLIC REFERENCE MAP (R=3)

```
            COMPLEX FUNCTION CDET (A,M,MID,ENT,NIX)                          CDET    2
      C                                                                      CDET    3
      C  TRIANGULAR DECOMPOSITION WITH OPTIONAL DETERMINANT CALCULATION.     CDET    4
      C                                                                      CDET    5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    CDET    6
      C     COMPLEX*16 SUM                                                   CDET    7
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       CDET    8
      C                                                                      CDET    9
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS    CDET   10
            COMPLEX SUM                                                      CDET   11
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       CDET   12
      C                                                                      CDET   13
            COMPLEX    A, H, COMSCA                                          CDET   14
            DIMENSION A(1),ENT(1)                                            CDET   15
            EQUIVALENCE (L1,EL)                                              CDET   16
            CAP(H) = ABS(REAL(H)) + ABS( AIMAG(H))                           CDET   17
            IFOOL(I,J,K) = IABS(I-I) + IABS(J-J) + IABS(K-K)                 CDET   18
            IZERO = 0                                                        CDET   19
            DELTA     =  1.0E-10                                             CDET   20
            N = IABS(M)                                                      CDET   21
            IF (M)  100, 110, 110                                            CDET   22
        100 D = 0.                                                           CDET   23
            GO TO 120                                                        CDET   24
        110 D = 1.                                                           CDET   25
        120 EPS = DELTA                                                      CDET   26
            IF (EPS .LT. 0.  .OR.  EPS .GT. 1.E-5)  EPS = 3.E-7              CDET   27
        130 KK = 1                                                           CDET   28
            KB = 1                                                           CDET   29
            NK = N                                                           CDET   30
            LAST = N*MID                                                     CDET   31
            DO 136  K1 = 1,N                                                 CDET   32
            G = 0.                                                           CDET   33
            DO 133  KJ = K1,LAST,MID                                         CDET   34
            G       =  AMAX1(G,CAP(A(KJ)))                                   CDET   35
        133 CONTINUE                                                         CDET   36
            IF (G - 1.E-70) 350, 350, 135                                    CDET   37
        135 CONTINUE                                                         CDET   38
            ENT(K1) =  ABS(4./G)                                             CDET   39
        136 CONTINUE                                                         CDET   40
            DO 300  K1 = 1,N                                                 CDET   41
      C   SET G TO MAX. ELT. OF (IMPLICITLY) SCALED ORIGINAL COLUMN K.       CDET   42
            G = 0.                                                           CDET   43
            I = 1                                                            CDET   44
            DO 140  IK = KB,NK                                               CDET   45
            G = AMAX1(G,ENT(I)*CAP(A(IK)))                                   CDET   46
            I       =  I + 1                                                 CDET   47
        140 CONTINUE                                                         CDET   48
            TOL = G * EPS                                                    CDET   49
            G = 0.                                                           CDET   50
            I1 = 1                                                           CDET   51
            DO 190  IK = KB,NK                                               CDET   52
            J = I1 - K1                                                      CDET   53
            IF (J) 150,150,160                                               CDET   54
        150 L = I1 - 1                                                       CDET   55
        160 SUM = A(IK)                                                      CDET   56
            A(IK) = COMSCA(A(I1),A(KB),SUM,L,MID,1)                          CDET   57
            IF (J) 189,170,170                                               CDET   58
```

```
STATEMENT LABELS                 DEF LINE   REFERENCES
    O  1                            36          26         27
    O  3                            41          39         40

LOOPS   LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   35   1         I           26 36        35B                 NOT INNER
   46   1         J           27 36        21B          OPT
   77   3         I           39 41        15B                 NOT INNER
  105   3         J           40 41         4B      INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTAPES        50                0 ITAPES (50)
       COMA          41                0 LC      (40)              40 BR      (1)
       FLEXT       3242                0 BB      (3200)          3200 OMG     (40)              3240 RHO     (1)
                                    3241 VB      (1)
       FLUTV          7                0 VL      (1)                1 VH      (1)                  2 FLO     (1)
                                       3 FHI     (1)                4 IE      (1)                  5 NQZ     (1)
                                       6 NVTOT   (1)
       FACE           6                0 SCALE   (1)                1 FACT    (1)                  2 PROD    (1)
                                       3 EM      (1)                4 ROWS    (1)                  5 VELOC   (1)
       FITR          41                0 NOMI    (1)                1 NIND    (40)
       MODD        8041                0 B       (3200)          3200 DETAD   (3200)            6400 WW      (1600)
                                    8000 OMM     (40)            8040 NC      (1)

STATISTICS
  PROGRAM LENGTH                  6440B     3360
  CM LABELED COMMON LENGTH       26244B    11428
          52000B CM USED
```

```
VARIABLES      SN  TYPE             RELOCATION
   50  BR          REAL                 COMA        REFS        10       24       25
 6200  DETAD       COMPLEX     ARRAY    MODD        REFS         7       15     2*32
    3  EM          REAL                 FACE        REFS        13
  165  ENT         REAL        ARRAY                REFS         5       42
  147  F           COMPLEX                       DEFINED        42
    1  FACT        REAL                 FACE        REFS        13
    3  FHI         REAL                 FLUTV       REFS        12
    2  FLO         REAL                 FLUTV       REFS        12
  162  I           INTEGER                          REFS      2*28     2*29     5*32     3*36     2*41
                                                 DEFINED        26       39
    4  IE          INTEGER              FLUTV       REFS        12
  153  ITAPE       INTEGER                          REFS        23  DEFINED       17
    0  ITAPES      INTEGER     ARRAY    CTAPES      REFS         9       17
  163  J           INTEGER                          REFS      2*28     2*29     5*32     3*36     2*41
                                                 DEFINED        27       40
    0  LC          INTEGER     ARRAY    COMA        REFS         5       10       18
  155  MID         INTEGER                          REFS        23       42  DEFINED       19
17550  NC          INTEGER              MODD        REFS        15
    1  NIND        INTEGER     ARRAY    FITR        REFS         5       14       38
  164  NIX       * INTEGER                          REFS        42
    0  NOMI        INTEGER              FITR        REFS        14       38
  154  NQ          INTEGER                          REFS        26       27     2*38  DEFINED       18
    5  NQZ         INTEGER              FLUTV       REFS        12     2*38       39       40       42
    6  NVTOT       INTEGER              FLUTV       REFS        12
 6200  OMG         REAL        ARRAY    FLEXT       REFS         5       11
17500  OMM         REAL        ARRAY    MODD        REFS         5       15
    2  PROD        REAL                 FACE        REFS        13
  235  QRS         COMPLEX     ARRAY                REFS         7       23       28       29       32       36       38
                                                      41        42  DEFINED       28       29       32       36       41
  151  QV          COMPLEX                          REFS         8       36  DEFINED       20
 6250  RHO         REAL                 FLEXT       REFS        11       23       24       29
    4  ROWS        REAL                 FACE        REFS        13       41
    0  SCALE       REAL                 FACE        REFS        13
 6251  VB          REAL                 FLEXT       REFS        11     2*20       29
  156  VBB         REAL                             REFS        22  DEFINED       21
  157  VBO         REAL                             REFS        23       24       25  DEFINED       22
    5  VELOC       REAL                 FACE        REFS        13
    1  VH          REAL                 FLUTV       REFS        12
    0  VL          REAL                 FLUTV       REFS        12
14400  WW          REAL        ARRAY    MODD        REFS         5       15       36
  160  XX          REAL                             REFS        25       32  DEFINED       24
  161  XXX         REAL                             REFS        32  DEFINED       25
    0  Z           COMPLEX               F.P.       REFS         8     2*20       21       28       29
                                                 DEFINED         1

EXTERNALS          TYPE    ARGS        REFERENCES
       CDET        COMPLEX    5              8       42
       CONV                   5             38
       QFLIN                  6             23

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE   REFERENCES
       ABS         REAL       1  INTRIN                21
       AIMAG       REAL       1  INTRIN                21        28       29       32
       AMAX1       REAL       0  INTRIN                21
       CMPLX       COMPLEX    2  INTRIN                32
       CONJG       COMPLEX    1  INTRIN                28
       REAL        REAL       1  INTRIN                32
```

```
      6 CONTINUE                                                FRORD
        DO 7  J = 1,NQ                                          FRORD
        KQ       =  I - 4                                       FRORD
        DO 8  K = 1,3                                           FRORD
        KQ       =  KQ + 1                                      FRORD
        A = AIMAG(SOL(J,KQ))*VV(K)*CONST                        FRORD
        B = REAL(SOL(J,KQ))/AIMAG(SOL(J,KQ))                    FRORD
      8 RLT(K) = CMPLX(B,A)                                     FRORD
        RLLT     =  CMPLX (0.0,0.0)                             FRORD
        DO 9  K = 1,3                                           FRORD
      9 RLLT     =  RLLT + VOT(K) * RLT(K)                      FRORD
        FRR(J) = AIMAG(RLLT)                                    FRORD
      7 DRR(J) = REAL(RLLT)                                     FRORD
    200 DO 10  J = 1,NQ                                         FRORD
        IORD(J)  =  J                                           FRORD
        N1       =  J                                           FRORD
        RT1 = AIMAG(SOLL(J)) * V(I) * CONST                     FRORD
        DIF1 = ABS(RT1 - FRR(J))                                FRORD
        DO 11  K = 1,NQ                                         FRORD
        IF ( K .EQ. J )    GO TO 11                             FRORD
        RTDIFF = AIMAG(SOLL(K)) * V(I) * CONST                  FRORD
        DIFF = ABS( RTDIFF - FRR(J))                            FRORD
        IF ( DIFF .GE. DIF1 )   GO TO 11                        FRORD
        RT1 = RTDIFF                                            FRORD
        DIF1     =  DIFF                                        FRORD
        N1       =  K                                           FRORD
     11 CONTINUE                                                FRORD
        N2       =  N1 + 1                                      FRORD
        IF ( N2 .GT. NQ )       N2 = N2 - 2                     FRORD
        RT2 = AIMAG(SOLL(N2)) * V(I) * CONST                    FRORD
        DIF2 = ABS( RT2 - FRR(J))                               FRORD
        DO 12  K = 1,NQ                                         FRORD
        IF ( K .EQ. N1 .OR. K .EQ. N2 )       GO TO 12          FRORD
        RTDIFF = AIMAG(SOLL(K)) * V(I) * CONST                  FRORD
        DIFF = ABS( RTDIFF - FRR(J))                            FRORD
        IF ( DIFF .GE. DIF2 )   GO TO 12                        FRORD
        RT2 = RTDIFF                                            FRORD
        DIF2     =  DIFF                                        FRORD
        N2       =  K                                           FRORD
     12 CONTINUE                                                FRORD
        IF ( J .EQ. 1 )    GO TO 400                            FRORD
        JJ       =  J - 1                                       FRORD
        KLUE1    =  0                                           FRORD
        KLUE2    =  0                                           FRORD
        DO 14  K = 1,JJ                                         FRORD
        IF ( IORD(K) .EQ. N1 )       KLUE1 = 1                  FRORD
        IF ( IORD(K) .EQ. N2 )       KLUE2 = 1                  FRORD
     14 CONTINUE                                                FRORD
        IF ( KLUE1 .EQ. 0 .AND. KLUE2 .EQ.1 )       GO TO 300   FRORD
        IF(KLUE1.EQ.1.AND.KLUE2.EQ.1) GO TO 1000                FRORD
        IF ( KLUE1 .EQ. 0 .AND. KLUE2 .EQ.0 )       GO TO 400   FRORD
        N1       =  N2                                          FRORD
        GO TO 300                                               FRORD
    400 DELTA = ABS((RT1 - RT2 )/RT2 )                          FRORD
        IF(DIF2.GE.1.5*DIF1.AND.DELTA.GE.0.05) GO TO 300        FRORD
        DID1     =  ABS (REAL(SOLL(N1))/AIMAG(SOLL(N1)) - DRR(J) )   FRORD
        DID2     =  ABS (REAL(SOLL(N2))/AIMAG(SOLL(N2)) - DRR(J) )   FRORD
```

```
             IF(DID2.GT.DID1) GO TO 300                                          FRORD     116
             FRRN1 = DIF1/DIF2                                                   FRORD     117
             DRRN2 = DID2/DID1                                                   FRORD     118
             IF(DRRN2.LT.FRRN1) N. = N2                                          FRORD     119
         300 IORD(J)  =  N1                                                      FRORD     120
          10 CONTINUE                                                            FRORD     121
             DO 15  J = 1,NQ                                                     FRORD     122
             II        =  IORD(J)                                                FRORD     123
          15 SOL(J,I)  =  SOLL(II)                                               FRORD     124
             IF ( KEXT .NE. O )       GO TO 500                                  FRORD     125
           1 CONTINUE                                                            FRORD     126
         500 RETURN                                                              FRORD     127
        1000 WRITE(ITAPEW,1001) I,J                                              FRORD     128
        1001 FORMAT(1H1,////58H********* ABNORMAL EXIT FROM ORDERING SUBROUTINE  FRORD     129
            1 *********,///11X,13HVELOCITY NO. ,I4,8X,9HROOT NO. ,I4,/)          FRORD     130
             RETURN                                                              FRORD     131
             END                                                                 FRORD     132
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    36     I        V         ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  FRORD          1           126        130

VARIABLES       SN  TYPE            RELOCATION
   541  A           REAL                           REFS        42        65   DEFINED        40        63
   542  B           REAL                           REFS        42        65   DEFINED        41        64
     O  BR          REAL                 F.P.      REFS        13   DEFINED         1
   533  CONST       REAL                           REFS        20        40        63        74        78        87        91
                                                DEFINED        13
   556  DELTA       REAL                           REFS       112   DEFINED       111
   557  DID1        REAL                           REFS       115       117   DEFINED       113
   560  DID2        REAL                           REFS       115       117   DEFINED       114
   550  DIFF        REAL                           REFS        80        82        93        95   DEFINED        79        92
   546  DIF1        REAL                           REFS        80       112       116   DEFINED        75        82
   553  DIF2        REAL                           REFS        93       112       116   DEFINED        88        95
   634  DRR         REAL         ARRAY             REFS         5       113       114   DEFINED        47        70
   562  DRRN2       REAL                           REFS       118   DEFINED       117
   564  FRR         REAL         ARRAY             REFS         5        21        75        79        88        92
                                                DEFINED        20        46        69
   561  FRRN1       REAL                           REFS       118   DEFINED       116
   535  I           INTEGER                        REFS        17        18      2*20        24        26        30        31
                                                     49        57        60        74        78        87        91       123
                                                    127   DEFINED        16
   563  II          INTEGER                        REFS       123   DEFINED       122
   704  IORD        INTEGER      ARRAY             REFS         5       103       104       122   DEFINED        72       119
   754  IPERM       INTEGER      ARRAY             REFS         5        21        23
```

```
VARIABLES      SN  TYPE            RELOCATION
    O  ITAPES      INTEGER    ARRAY    CTAPES      REFS        7        11       14
  534  ITAPEW      INTEGER                      DEFINED       14   I/O REFS     127
  536  J           INTEGER                         REFS     2*20        23       24     2*26     2*30      33      35
                                                   3*36       40      2*41       46       47       52      54      56
                                                   3*57       63      2*64       69       70     2*72      73      74
                                                     75       77        79       88       92       98      99     113
                                                    114      119       122      123      127  DEFINED      19      22
                                                     25       29        32       38       50       53      59      71
                                                    121
  537  JJ          INTEGER                         REFS       24       102  DEFINED       23       99
  540  K           INTEGER                         REFS       35      2*36     2*40     2*41       42    2*45      56
                                                   2*57       63        65     2*68       77       78      83    2*90
                                                     91       96       103      104  DEFINED       34      39      44
                                                     55       61        67       76       89      102
    O  KCR         INTEGER   *UNUSED   F.P.     DEFINED        1
    O  KEXT        INTEGER             F.P.        REFS       17        27      124  DEFINED        1
  554  KLUE1       INTEGER                         REFS      106       107      108  DEFINED      100     103
  555  KLUE2       INTEGER                         REFS      106       107      108  DEFINED      101     104
    O  KPNT        INTEGER   *UNUSED   F.P.     DEFINED        1
  543  KQ          INTEGER                         REFS       51        52       62       63     2*64
                                                DEFINED       49        51       60       62
    O  MID         INTEGER             F.P.        REFS        9   DEFINED        1
    O  NQ          INTEGER             F.P.        REFS       19        21       22       25       29      38      59
                                                     71       76        86       89      121  DEFINED       1
    O  NV          INTEGER             F.P.        REFS       16   DEFINED        1
    O  NVA         INTEGER             F.P.        REFS       17   DEFINED        1
  544  N1          INTEGER                         REFS       85        90      103    2*113      119
                                                DEFINED       73        83      109      118
  551  N2          INTEGER                         REFS     2*86        87       90      104      109   2*114     118
                                                DEFINED       85        86       96
  531  RLLT        COMPLEX                         REFS        9        45       46       47       68      69      70
                                                DEFINED       43        45       66       68
 1152  RLT         COMPLEX    ARRAY                REFS        9        45       68  DEFINED       42      65
  547  RTDIFF      REAL                            REFS       79        81       92       94  DEFINED      78      91
  545  RT1         REAL                            REFS       75       111  DEFINED       74       81
  552  RT2         REAL                            REFS       88     2*111  DEFINED       87       94
    O  SOL         COMPLEX    ARRAY    F.P.        REFS        9        20       24       30       40    2*41      63
                                                   2*64  DEFINED         1       26      123
 1032  SOLL        COMPLEX    ARRAY                REFS        9        26       74       78       87      91   2*113
                                                  2*114      123   DEFINED       24       30
    O  V           REAL       ARRAY    F.P.        REFS        6        20     4*36       40       52      57      74
                                                     78       87        91  DEFINED        1
    O  VELCR       REAL      *UNUSED   F.P.     DEFINED        1
 1027  VOT         REAL       ARRAY                REFS        6        36       45       57       68
                                                DEFINED       33        36       54       57
 1024  VV          REAL       ARRAY                REFS        6      3*57       63  DEFINED       52
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       AORDER               4              21

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       ABS         REAL      1  INTRIN               75       79        88       92      111      113     114
       AIMAG       REAL      1  INTRIN               20       40        41       46       63       64      69      74
                                                     78       87        91      113      114
       CMPLX       COMPLEX   2  INTRIN               42       43        65       66
       REAL        REAL      1  INTRIN               41       47        64       70      113      114
```

```
STATEMENT LABELS                  DEF LINE   REFERENCES
  463   1                            125        16        17        28
    0   2                             30        29
  126   3                             37        32        34        35
    0   4                             52        50
  221   6                             58        53        55        56
    0   7                             70        59
    0   8                             65        61
    0   9                             68        67
    0   10                           120        71
  321   11                            84        76        77        80
  361   12                            97        89        90        93
    0   13                            47        38
    0   14                           105       102
    0   15                           123       121
    0   16                            42        39
    0   17                            45        44
   75   18                            29        18
    0   19                            20        19
    0   20                            24        22
    0   21                            26        25
  172   100                           49        31
  272   200                           71        48
  442   300                          119       106       110       112       115
  414   400                          111        98       108
  466   500                          126        27       124
  467   1000                         127       107
  506   1001    FMT                  128       127

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   16  1          I        16 125      450B               EXT REFS    EXITS    NOT INNER
   33  19         J        19 20         4B      INSTACK
   52  20         J        22 24         6B      INSTACK
   70  21         J        25 26         3B      INSTACK
  104  2          J        29 30         3B      INSTACK
  113  3          J        32 37        20B               NOT INNER
  121  3          K        34 37         6B      INSTACK
  134  13         J        38 47        36B               NOT INNER
  143  16         K        39 42         5B      INSTACK
  156  17         K        44 45         6B      INSTACK
  200  4          J        50 52         3B      INSTACK
  205  6          J        53 58        21B               NOT INNER
  214  6          K        55 58         6B      INSTACK
  227  7          J        59 70        43B               NOT INNER
  241  8          K        61 65         7B      INSTACK
  256  9          K        67 68         6B      INSTACK
  273  10         J        71 120      153B                 EXITS    NOT INNER
  310  11         K        76 84        13B        OPT
  345  12         K        89 97        16B        OPT
  373  14         K       102 105        7B      INSTACK
  454  15         J       121 123        5B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      CTAPES        50               0 ITAPES (50)
```

```
STATISTICS
  PROGRAM LENGTH                1224B       660
  CM LABELED COMMON LENGTH        62B        50
          52000B CM USED
```

```
            SUBROUTINE VECP (NV,    V.SOL,          KCR,V1,V2,MID)       VECP      2
      C                                                                  VECP      3
      C     VECTOR ROUTINE FOR FLUTTER MODE                              VECP      4
      C                                                                  VECP      5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS VECP     6
      C     COMPLEX*16 SUM    ,DCMPLF                                    VECP      7
      C     DOUBLE PRECISION ARG1,ARG2                                   VECP      8
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   VECP      9
      C                                                                  VECP     10
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS VECP    11
            COMPLEX SUM    ,DCMPLF                                       VECP     12
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS   VECP     13
      C                                                                  VECP     14
            DIMENSION V(1), QZ(220), WW(40,40), OMM(40), OMG(40)         VECP     15
            DIMENSION NIND(40)                                           VECP     16
            DIMENSION ITAPES(50)                                         VECP     17
      C                                                                  VECP     18
            COMPLEX B(40,40), DETAD(40,40), SOL(MID,1)                   VECP     19
            COMPLEX VEC(40), QRS(40,40), GK(40,40), QZZ(220)             VECP     20
            COMPLEX VEP(220), Z, QV, COMSCA                              VECP     21
      C                                                                  VECP     22
            COMMON /MODD  / B, DETAD, WW, OMM, NC                        VECP     23
            COMMON / FLUTV / VL, VH, FLO, FHI, IE, NQZ, NVTOT            VECP     24
            COMMON /FLEXT / GK, OMG, RHO, VB                             VECP     25
            COMMON / CTAPES / ITAPES                                     VECP     26
            COMMON / COMA / LC(40), BR                                   VECP     27
            COMMON / FITR / NOMI,NIND                                    VECP     28
      C                                                                  VECP     29
      C                                                                  VECP     30
            ITAPEW = ITAPES(6)                                           VECP     31
            MTAP49 =  ITAPES(49)                                         VECP     32
            ITAPE = ITAPES(50)                                           VECP     33
            ARG1 = 0.0                                                   VECP     34
            ARG2 = 0.0                                                   VECP     35
            NORIG = LC(2)                                                VECP     36
      C                                                                  VECP     37
      C                                                                  VECP     38
            DO 1  I = 1,NV                                               VECP     39
            IF ( V(I) .LT. VL .OR. V(I) .GT. VH )       GO TO 1          VECP     40
            VB        =  V(I) * 1.6878 / BR                              VECP     41
            Z         =  SOL (KCR,I)                                     VECP     42
            QV        =  Z * Z * VB * VB                                 VECP     43
            QVV       =  RHO * VB * VB * AIMAG(Z) * AIMAG(Z)             VECP     44
            VBB       =  AMAX1 (1.E-4 , ABS(AIMAG(Z)))                   VECP     45
            VBO       =  1.0 / VBB                                       VECP     46
            CALL QFLIN (ITAPE,VBO,QRS,RHO,O,MID)                         VECP     47
            XX        =  RHO * VBO * BR                                  VECP     48
            XXX       =   XX * VBO * BR                                  VECP     49
            DO 2 J=1,NORIG                                               VECP     50
            DO 2 K=1,NORIG                                               VECP     51
            QRS(J,K)  =  -QRS(J,K) * QVV                                 VECP     52
           1          + CMPLX(REAL(DETAD(I,J))*XXX,AIMAG(DETAD(I,J))*XX) VECP     53
          2 QRS(J,K) = QRS(J,K) + GK(J,K) + QV * WW(J,K)                 VECP     54
            IF (NQZ.LT.NORIG)  CALL CONV (NORIG,NQZ,NOMI,NIND,QRS)       VECP     55
            CALL GENEIG (NQZ,QRS,VEC,MID)                                VECP     56
            IF (LC(29).EQ.O) GO TO 4                                     VECP     57
            REWIND MTAP49                                                VECP     58
```

```
      DO 5  N=1,NQZ
    5 READ (MTAP49) DUMMY,COORDS
      DO 3  J = 1,NC
      CALL RNRW  (-MTAP49, QZ, NQZ)
      DO 10  II=1,NQZ
   10 QZZ(II) = CMPLX (QZ(II),0.0)
      SUM = DCMPLF(ARG1,ARG2)
    3 VEP(J)  = COMSCA (VEC, QZZ, SUM, NQZ, 1, 1)
    4 CONTINUE
      REWIND MTAP49
      VELEQ    =  V(I) * SQRT(RHO/0.076474)
      WRITE (ITAPEW,20)  V(I) , VELEQ , RHO
      WRITE (ITAPEW,30)
      LINES    =    10 + NQZ/3
      WRITE (ITAPEW,40)     (J, VEC(J), J=1,NQZ)
      IF (LC(29).EQ.0) GO TO 1
      WRITE (ITAPEW,60)
      WRITE (ITAPEW,30)
      NCC      =  NC / 3
      NCR      =  NC - 3*NCC
      NCO      =   NCC *3
      DO 70  J = 1,NCO,3
      LINES    =  LINES + 1
      IF ( LINES .LT. 55 )          GO TO 80
      WRITE (ITAPEW,50)
      WRITE (ITAPEW,60)
      WRITE (ITAPEW,30)
      LINES    = 7
   80 II1      =  J
      II2    . =  J + 1
      II3      =  J + 2
   70 WRITE (ITAPEW,40)   II1,VEP(II1),II2,VEP(II2),II3,VEP(II3)
      IF ( NCR .EQ. 0 )        GO TO 1
      IF ( NCR .EQ. 2 )        GO TO 90
      WRITE (ITAPEW,40)   NC,VEP(NC)
      GO TO 1
   90 II1      =  NC - 1
      II2      =  NC
      WRITE (ITAPEW,40)   II1,VEP(II1),II2,VEP(II2)
    1 CONTINUE
C
C
C FORMATS
C
   20 FORMAT (1H1,/15X42HEIGENVECTOR FOR CRITICAL FLUTTER SPEED FOR,//
     1         20X10HV(TRUE) = ,F12.4,15X8HV(EQ) = ,F12.4,15X,
     2         18HRHO(LBS/CU.FT.) = ,F16.8//)
   30 FORMAT (4X,3(5HINDEX,4X,4HREAL,10X4HIMAG,9X)//)
   40 FORMAT (3(5X,I3,2X,E12.4,2X,E12.4))
   50 FORMAT (1H1)
   60 FORMAT (//20X14HFLUTTER VECTOR,//)
C
      RETURN
      END
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  VECP            1          110

VARIABLES       SN  TYPE            RELOCATION
   515  ARG1        REAL                         REFS      64   DEFINED      33
   516  ARG2        REAL                         REFS      64   DEFINED      34
     0  B           COMPLEX   ARRAY    MODD      REFS      18        22
    50  BR          REAL               COMA      REFS      26        40      47       48
   532  COORDS   *  REAL                      DEFINED      59
  6200  DETAD       COMPLEX   ARRAY    MODD      REFS      18        22    2*51
   531  DUMMY    *  REAL                      DEFINED      59
     3  FHI         REAL               FLUTV     REFS      23
     2  FLO         REAL               FLUTV     REFS      23
     0  GK          COMPLEX   ARRAY    FLEXT     REFS      19        24      53
   520  I           INTEGER                      REFS    2*39        40      41     2*51       68       69
                                              DEFINED      38
     4  IE          INTEGER            FLUTV     REFS      23
   533  II          INTEGER                      REFS    2*63   DEFINED      62
   541  II1         INTEGER                      REFS    2*89      2*96  DEFINED      86       94
   542  II2         INTEGER                      REFS    2*89      2*96  DEFINED      87       95
   543  II3         INTEGER                      REFS    2*89   DEFINED      88
   514  ITAPE       INTEGER                      REFS      46   DEFINED      32
     0  ITAPES      INTEGER   ARRAY    CTAPES    REFS      16        25      30       31       32
   512  ITAPEW      INTEGER                   DEFINED      30  I/O REFS      69       70       72       74       75
                                                   82      83        84      89       92       96
   526  J           INTEGER                      REFS    4*51      4*53      65     2*72       86       87       88
                                              DEFINED      49        60      72       79
   527  K           INTEGER                      REFS    2*51      4*53  DEFINED      50
     0  KCR         INTEGER             F.P.     REFS      41   DEFINED       1
     0  LC          INTEGER   ARRAY    COMA      REFS      26        35      56       73
   535  LINES       INTEGER                      REFS      80        81  DEFINED      71       80       85
     0  MID         INTEGER             F.P.     REFS      18        46      55  DEFINED        1
   513  MTAP49      INTEGER                      REFS      61   DEFINED      31  I/O REFS      57       59       67
   530  N        *  INTEGER                   DEFINED      58
 17550  NC          INTEGER            MODD      REFS      22        60      76       77     2*92       94       95
   536  NCC         INTEGER                      REFS      77        78  DEFINED      76
   540  NCO         INTEGER                      REFS      79   DEFINED      78
   537  NCR         INTEGER                      REFS      90        91  DEFINED      77
     1  NIND        INTEGER   ARRAY    FITR      REFS      15        27      54
     0  NOMI        INTEGER            FITR      REFS      27        54
   517  NORIG       INTEGER                      REFS      49        50    2*54  DEFINED       35
     5  NQZ         INTEGER            FLUTV     REFS      23      2*54      55       58       61       62       65
                                                   71      72
     0  NV          INTEGER             F.P.     REFS      38   DEFINED       1
     6  NVTOT       INTEGER            FLUTV     REFS      23
  6200  OMG         REAL      ARRAY    FLEXT     REFS      14        24
 17500  OMM         REAL      ARRAY    MODD      REFS      14        22
  1220  QRS         COMPLEX   ARRAY              REFS      19        46      51       53       54       55
                                              DEFINED      51        53
   510  QV          COMPLEX                      REFS      20        53  DEFINED      42
   521  QVV         REAL                         REFS      51   DEFINED      43
   544  QZ          REAL      ARRAY              REFS      14        61      63
  7420  QZZ         COMPLEX   ARRAY              REFS      19        65  DEFINED      63
  6250  RHO         REAL               FLEXT     REFS      24        43      46       47       68       69
```

```
VARIABLES      SN  TYPE            RELOCATION
     0  SOL         COMPLEX     ARRAY      F.P.       REFS        18        41    DEFINED       1
   504  SUM         COMPLEX                           REFS        11        65    DEFINED      64
     0  V           REAL        ARRAY      F.P.       REFS        14      2*39        40       68        69
                                                    DEFINED        1
  6251  VB          REAL                   FLEXT      REFS        24      2*42      2*43  DEFINED        40
   522  VBB         REAL                              REFS        45   DEFINED        44
   523  VBO         REAL                              REFS        46        47        48  DEFINED        45
  1100  VEC         COMPLEX     ARRAY                 REFS        19        55        65       72
   534  VELEQ       REAL                              REFS        69   DEFINED        68
 10310  VEP         COMPLEX     ARRAY                 REFS        20      3*89        92     2*96   DEFINED       65
     1  VH          REAL                   FLUTV      REFS        23        39
     0  VL          REAL                   FLUTV      REFS        23        39
     0  V1          REAL       *UNUSED     F.P.     DEFINED        1
     0  V2          REAL       *UNUSED     F.P.     DEFINED        1
 14400  WW          REAL        ARRAY      MODD       REFS        14        22        53
   524  XX          REAL                              REFS        48        51    DEFINED      47
   525  XXX         REAL                              REFS        51   DEFINED        48
   506  Z           COMPLEX                           REFS        20      2*42      2*43       44   DEFINED       41
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS         REFERENCES
        COMSCA      COMPLEX    6              20        65
        CONV                   5              54
        DCMPLF      COMPLEX    2              11        64
        GENEIG                 4              55
        QFLIN                  6              46
        RNRW                   3              61
        SQRT        REAL       1 LIBRARY      68

INLINE FUNCTIONS   TYPE    ARGS          DEF LINE  REFERENCES
        ABS         REAL       1  INTRIN               44
        AIMAG       REAL       1  INTRIN             2*43       44        51
        AMAX1       REAL       0  INTRIN               44
        CMPLX       COMPLEX    2  INTRIN               51       63
        REAL        REAL       1  INTRIN               51

STATEMENT LABELS              DEF LINE    REFERENCES
   277  1                          97          38        39       73        90        93
     0  2                          53          49        50
     0  3                          65          60
   157  4                          66          56
     0  5                          59          58
     0  10                         63          62
   441  20         FMT            102          69
   457  30         FMT            105          70        75       84
   464  40         FMT            106          72        89       92        96
   470  50         FMT            107          82
   472  60         FMT            108          74        83
     0  70                         89          79
   237  80                         86          81
   266  90                         94          91

LOOPS   LABEL      INDEX      FROM-TO     LENGTH     PROPERTIES
    20  1          I          38 97        262B               EXT REFS  NOT INNER
    55  2          J          49 53         35B               NOT INNER
    74  2          K          50 53         13B         OPT
   125  5          N          58 59          5B               EXT REFS
```

```
LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
  133  3        J          60 65       24B                EXT REFS  NOT INNER
  142  10       I1         62 63        3B      INSTACK
  202           J          72 72        7B                EXT REFS
  225  70       J          79 89       31B                EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       MODD      8041              0 B       (3200)          3200 DETAD  (3200)         6400 WW      (1600)
                                8000 OMM     (40)            8040 NC     (1)
       FLUTV        7              0 VL      (1)                1 VH     (1)               2 FLO     (1)
                                   3 FHI     (1)                4 IE     (1)               5 NQZ     (1)
                                   6 NVTOT   (1)
       FLEXT     3242              0 GK      (3200)          3200 OMG    (40)           3240 RHO     (1)
                                3241 VB      (1)
       CTAPES      50              0 ITAPES  (50)
       COMA        41              0 LC      (40)              40 BR     (1)
       FITR        41              0 NOMI    (1)                1 NIND   (40)

STATISTICS
  PROGRAM LENGTH                11211B    4745
  CM LABELED COMMON LENGTH      26236B   11422
        52000B CM USED
```

```
      SUBROUTINE GENEIG (NN,AE,EVEC,MID)                                GENEIG   2
      DIMENSION ITAPES(50)                                              GENEIG   3
C                                                                       GENEIG   4
      COMPLEX AE(MID,1), EVEC(1)                                        GENEIG   5
      COMPLEX B(40,40), C(40,40), X(40)                                 GENEIG   6
      COMMON / CTAPES / ITAPES                                          GENEIG   7
C                                                                       GENEIG   8
C                                                                       GENEIG   9
      ITAPEW = ITAPES(6)                                                GENEIG  10
C                                                                       GENEIG  11
C                                                                       GENEIG  12
      NX        =  NN - 1                                               GENEIG  13
      IT        =  1                                                    GENEIG  14
      ITL       =  IT                                                   GENEIG  15
      IR        =  0                                                    GENEIG  16
      GO TO 7                                                           GENEIG  17
C                                                                       GENEIG  18
    5 IR        =  IT                                                   GENEIG  19
      IT        =  IT + 1                                               GENEIG  20
      ITL       =  IT                                                   GENEIG  21
    7 ITT       =  IT - 1                                               GENEIG  22
      IF ( ITT .GT. 0 )        GO TO 50                                 GENEIG  23
      EVEC(1)  =  CMPLX (1.0,0.0)                                       GENEIG  24
      DO 20 IB = 1,NN                                                   GENEIG  25
      DO 20 IA = 1,NX                                                   GENEIG  26
   20 B(IB,IA)  =  AE(IB,IA+1)                                          GENEIG  27
      DO 30 IB = 1,NN                                                   GENEIG  28
   30 B(IB,NN)  =  -AE(IB,1)                                            GENEIG  29
      GO TO 200                                                         GENEIG  30
   50 IF (IT .LT. NN )         GO TO 100                                GENEIG  31
      EVEC(NN)  =  CMPLX (1.0,0.0)                                      GENEIG  32
      DO 80  IB = 1,NN                                                  GENEIG  33
      DO 80  IA = 1,NX                                                  GENEIG  34
   80 B(IB,IA)  =  AE(IB,IA)                                            GENEIG  35
      DO 90  IB = 1,NN                                                  GENEIG  36
   90 B(IB,NN)  =  -AE(IB,NN)                                           GENEIG  37
      GO TO 200                                                         GENEIG  38
  100 EVEC(IT)  =  CMPLX (1.0,0.0)                                      GENEIG  39
      DO 130  IB = 1,NN                                                 GENEIG  40
      DO 130  IA = 1,ITT                                                GENEIG  41
  130 B(IB,IA)  =  AE(IB,IA)                                            GENEIG  42
      DO 150  IB = 1,NN                                                 GENEIG  43
      DO 150  IA = IT,NX                                                GENEIG  44
  150 B(IB,IA)  =  AE(IB,IA+1)                                          GENEIG  45
      DO 160  IB = 1,NN                                                 GENEIG  46
  160 B(IB,NN)  =  -AE(IB,IT)                                           GENEIG  47
  200 IRR       =  IR                                                   GENEIG  48
      IR        =  IR + 1                                               GENEIG  49
      IF ( IR .LE. NN )        GO TO 205                                GENEIG  50
      IR        =  1                                                    GENEIG  51
      IRR       =  0                                                    GENEIG  52
      ITL       =  -IT                                                  GENEIG  53
  205 IF ( IRR .GT. 0 )        GO TO 240                                GENEIG  54
      DO 230  IB = 1,NX                                                 GENEIG  55
      DO 230  IA = 1,NN                                                 GENEIG  56
  230 C(IB,IA)  =  B(IB+1,IA)                                           GENEIG  57
      GO TO 350                                                         GENEIG  58
```

```
          240 IF ( IR .LT. NN )       GO TO 280                                    GENEIG     59
              DO 270  IB = 1,NX                                                    GENEIG     60
              DO 270  IA = 1,NN                                                    GENEIG     61
          270 C(IB,IA) =  B(IB,IA)                                                 GENEIG     62
              GO TO 350                                                            GENEIG     63
          280 DO 300  IB = 1,IRR                                                   GENEIG     64
              DO 300  IA = 1,NN                                                    GENEIG     65
          300 C(IB,IA)  =  B(IB,IA)                                                GENEIG     66
              DO 320  IB = IR,NX                                                   GENEIG     67
              DO 320  IA = 1,NN                                                    GENEIG     68
          320 C(IB,IA)  =  B(IB+1,IA)                                              GENEIG     69
          350 CALL JORCOM (C,NX,X,MID,MID)                                         GENEIG     70
              IF ( ITT .GT. 0 )       GO TO 380                                    GENEIG     71
              DO 370  IA = 2,NN                                                    GENEIG     72
          370 EVEC(IA)  =  X(IA-1)                                                 GENEIG     73
              GO TO 450                                                            GENEIG     74
          380 IF ( IT .LT. NN )       GO TO 410                                    GENEIG     75
              DO 400  IA = 1,NX                                                    GENEIG     76
          400 EVEC(IA)  =  X(IA)                                                   GENEIG     77
              GO TO 450                                                            GENEIG     78
          410 DO 420  IB = 1,ITT                                                   GENEIG     79
          420 EVEC(IB)  =  X(IB)                                                   GENEIG     80
              DO 430  IB = IT,NX                                                   GENEIG     81
          430 EVEC(IB+1)  =  X(IB)                                                 GENEIG     82
          450 CALL ORIENT (EVEC,NN)                                                GENEIG     83
              IF ( CABS(EVEC(IT)) .GE. .02 )    GO TO 500                          GENEIG     84
              IF ( IT .LT. NN )       GO TO 5                                      GENEIG     85
              WRITE (ITAPEW,490) (EVEC(IB),IB=1,NN)                                GENEIG     86
        C                                                                          GENEIG     87
        C                                                                          GENEIG     88
        C FORMATS                                                                  GENEIG     89
        C                                                                          GENEIG     90
           40 FORMAT (/(15X,G16.8,3X,G16.8,15X,G16.8,3X,G16.8))                    GENEIG     91
          490 FORMAT (1H1,10X39HUNABLE TO FIND EIGENVECTOR, LAST TRY = , /         GENEIG     92
            1         (5X(E22.11,5X,E22.11)))                                      GENEIG     93
        C                                                                          GENEIG     94
          500 RETURN                                                               GENEIG     95
              END                                                                  GENEIG     96
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  GENEIG         1            94

VARIABLES     SN  TYPE          RELOCATION
    0  AE         COMPLEX    ARRAY     F.P.     REFS        4      26      28      34      36      41      44
                                                   46   DEFINED       1
  471  B          COMPLEX    ARRAY              REFS        5      56      61      65      68
                                             DEFINED       26      28      34      36      41      44      46
 6671  C          COMPLEX    ARRAY              REFS        5      69 DEFINED      56      61      65      68
    0  EVEC       COMPLEX    ARRAY     F.P.     REFS        4      82      83      85 DEFINED       1      23
                                                   31      38      72      76      79      81
  467  IA         INTEGER                       REFS     2*26    2*34    2*41    2*44    2*56    2*61    2*65
```

```
VARIABLES     SN  TYPE          RELOCATION
                                              2*68      2*72      2*76  DEFINED      25       33       40       43
                                                55        60        64       67      71       75
  466  IB       INTEGER                       REFS      2*26      2*28     2*34    2*36     2*41     2*44     2*46
                                              2*56      2*61      2*65     2*68    2*79     2*81       85
                                           DEFINED        24        27       32      35       39       42       45
                                                54        59        63       66      78       80       85
  464  IR       INTEGER                       REFS        47        48       49      58       66
                                           DEFINED        15        18       48      50
  470  IRR      INTEGER                       REFS        53        63  DEFINED      47       51
  462  IT       INTEGER                       REFS        14        18       19      20       21       30       38
                                                43        46        52       74      80       83       84
                                           DEFINED        13        19
    O  ITAPES   INTEGER   ARRAY   CTAPES      REFS         2         6        9
  460  ITAPEW   INTEGER                    DEFINED         9  I/O REFS       85
  463  ITL      INTEGER                    DEFINED        14        20       52
  465  ITT      INTEGER                       REFS        22        40       70      78  DEFINED       21
    O  MID      INTEGER           F.P.        REFS         4      2*69  DEFINED       1
    O  NN       INTEGER           F.P.        REFS        12        24       27      28       30       31       32
                                                35      2*36        39       42      45       46       49       55
                                                58        60        64       67      71       74       82       84
                                                85   DEFINED         1
  461  NX       INTEGER                       REFS        25        33       43      54       59       66       69
                                                75        80   DEFINED       12
15071  X        COMPLEX   ARRAY               REFS         5        69       72      76       79       81
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS        REFERENCES
       CABS       REAL        1 LIBRARY      83
       JORCOM                 5              69
       ORIENT                 2              82

INLINE FUNCTIONS   TYPE   ARGS         DEF LINE  REFERENCES
       CMPLX      COMPLEX     2  INTRIN                23        31        38

STATEMENT LABELS              DEF LINE    REFERENCES
   16  5                         18          84
   21  7                         21          16
    O  20                        26          24        25
    O  30                        28          27
  440  40     FMT  NO REFS       90
   61  50                        30          22
    O  80                        34          32        33
    O  90                        36          35
  124  100                       38          30
    O  130                       41          39        40
    O  150                       44          42        43
    O  160                       46          45
  206  200                       47          29        37
  214  205                       53          49
    O  230                       56          54        55
  235  240                       58          53
    O  270                       61          59        60
  257  280                       63          58
    O  300                       65          63        64
    O  320                       68          66        67
  315  350                       69          57        62
    O  370                       72          71
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  336  380                       74          70
    0  400                       76          75
  354  410                       78          74
    0  420                       79          78
    0  430                       81          80
  401  450                       82          73         77
  445  490    FMT                91          85
  421  500                       94          83

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   27  20       IB         24 26       17B               NOT INNER
   37  20       IA         25 26        3B      INSTACK
   55  30       IB         27 28        3B      INSTACK
   70  80       IB         32 34       17B               NOT INNER
  100  80       IA         33 34        3B      INSTACK
  120  90       IB         35 36        3B      INSTACK
  131  130      IB         39 41       17B               NOT INNER
  141  130      IA         40 41        3B      INSTACK
  151  150      IB         42 44       20B               NOT INNER
  162  150      IA         43 44        3B      INSTACK
  202  160      IB         45 46        3B      INSTACK
  217  230      IB         54 56       16B               NOT INNER
  226  230      IA         55 56        3B      INSTACK
  241  270      IB         59 61       16B               NOT INNER
  250  270      IA         60 61        3B      INSTACK
  260  300      IB         63 65       16B               NOT INNER
  267  300      IA         64 65        3B      INSTACK
  277  320      IB         66 68       16B               NOT INNER
  306  320      IA         67 68        3B      INSTACK
  331  370      IA         71 72        3B      INSTACK
  347  400      IA         75 76        3B      INSTACK
  362  420      IB         78 79        3B      INSTACK
  375  430      IB         80 81        3B      INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
      CTAPES        50                0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 15226B    6806
  CM LABELED COMMON LENGTH          62B      50
          52000B CM USED
```

```
      C                                                                   GCVEC     116
      C FORMATS                                                           GCVEC     117
      C                                                                   GCVEC     118
         10 FORMAT (41HONO CONVERGENCE IN 10 TRIES WITH LAMBDA =,1P2E15.7 )  GCVEC     119
         20 FORMAT ( 8HOITER8 =, I2, 7H NORM =,G16.7 / (4G20.7))          GCVEC     120
      C                                                                   GCVEC     121
        500 RETURN                                                        GCVEC     122
            END                                                           GCVEC     123
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  GCVEC            1         121

VARIABLES     SN  TYPE            RELOCATION
    O  EPS        REAL                   DETAIL    REFS       30   DEFINED      38
    O  F          REAL        ARRAY      F.P.      REFS       25        65      66        72       110
                                                DEFINED        1        63      64        65        66
  343  G          REAL                             REFS       85        86      87   DEFINED        83
  344  H          REAL                             REFS       85        86      88   DEFINED        84
  331  HURDLE     REAL                             REFS       95   DEFINED      37
  336  I          INTEGER                          REFS       46        47      51        52        62        83        84
                                                   2*85     2*86        87      88      2*89      4*92      2*97      2*98
                                                   2*99    2*100     3*105   3*106       107       108       109
                                                DEFINED       45        61      82        92        96       104
  335  II         INTEGER                          REFS     2*65      2*66      67   DEFINED        44        67
  341  IJ         INTEGER                          REFS     4*63      4*64 DEFINED        62
    O  IT         INTEGER     ARRAY      F.P.      REFS       25        72     110   DEFINED         1
    O  ITAPES     INTEGER     ARRAY      CTAPES    REFS       26        31      34
  330  ITAPEW     INTEGER                       DEFINED       34  I/O REFS      92       113
    O  ITER8      INTEGER                F.P.      REFS       92       103     111   DEFINED         1        73       111
  332  KEY        INTEGER                          REFS      110   DEFINED      39
    O  LAMBDA     COMPLEX                F.P.      REFS       27        42      43       113   DEFINED         1
    1  LVEC       INTEGER                DETAIL    REFS       30        91
    O  M          INTEGER                F.P.      REFS       41        45      61        72        82        92        96
                                                    104      107       110 DEFINED         1
    O  MID        INTEGER                F.P.      REFS       40        41      62        72       107       110
                                                DEFINED        1
  334  MIDM       INTEGER                          REFS       62   DEFINED      41
  333  MID1       INTEGER                          REFS       67   DEFINED      40
  325  MU         REAL                             REFS       29      2*56      57        63        64        85        86
                                                    105      106   DEFINED      42
  342  NIX      * INTEGER                          REFS       72
  327  NORM       REAL                             REFS       29        51      89        90        92        95        97
                                                     98       99       100 DEFINED        81        89        90
  326  NU         REAL                             REFS       29      2*56      57        63        64        85        86
                                                    105      106   DEFINED      43
    O  P          REAL        ARRAY      F.P.      REFS       25      2*63    2*64       107   DEFINED         1
    O  Q          REAL        ARRAY      F.P.      REFS       25        63      64   DEFINED         1
  337  RHO        REAL                             REFS       65   DEFINED      56
    O  S          REAL        ARRAY      F.P.      REFS       25        83      84      2*92        97        98       105
                                                    106      110   DEFINED       1        51        52        85        86
                                                     97       98       108     109
```

```
C                                                                       GCVEC    59
C   FORM   LAMBDA**2 * I  +  LAMBDA * P  +  Q                           GCVEC    60
C                                                                       GCVEC    61
      DO  130   I = 1, M                                                GCVEC    62
      DO  120   IJ = I, MIDM, MID                                       GCVEC    63
      F(1,IJ) = Q(1,IJ)  +  MU * P(1,IJ)  -  NU * P(2,IJ)               GCVEC    64
  120 F(2,IJ) = Q(2,IJ)  +  MU * P(2,IJ)  +  NU * P(1,IJ)               GCVEC    65
      F(1,II) = F(1,II) + RHO                                           GCVEC    66
      F(2,II) = F(2,II) + SIGMA                                         GCVEC    67
  130 II = II + MID1                                                    GCVEC    68
C                                                                       GCVEC    69
C   CDAT IS A MODIFIED CDET, FIXED TO FORCE A FACTORIZATION COME WHAT   GCVEC    70
C   MAY.  THE FUNCTION VALUE (TARGET) IS OF NO INTEREST.                GCVEC    71
C                                                                       GCVEC    72
      TARGET = CDAT ( F, -M, MID, IT, NIX )                             GCVEC    73
      ITER8 = 0                                                         GCVEC    74
C                                                                       GCVEC    75
C   MAIN LOOP.  CLUSAL IS USED TO SOLVE (COMPLEX) SYSTEMS OF LINEAR     GCVEC    76
C   EQUATIONS.  IT IS CLUSOL MODIFIED TO PERFORM ONLY THE FORWARD SOLU- GCVEC    77
C   TION ( KEY = 1 ), ONLY THE BACK SOLUTION ( KEY =-1 ), OR BOTH       GCVEC    78
C   (WITH KEY = 0 ).  AT LEAST 2 ITERATIONS ARE CARRIED OUT, BUT NO MORE GCVEC    79
C   THAN 10.                                                            GCVEC    80
C                                                                       GCVEC    81
  150 NORM = 0.                                                         GCVEC    82
      DO  160   I = 1, M                                                GCVEC    83
      G = S(1,I)                                                        GCVEC    84
      H = S(2,I)                                                        GCVEC    85
      S(1,I) = MU * G  -  NU * H  +  V(1,I)                             GCVEC    86
      S(2,I) = MU * H  +  NU * G  +  V(2,I)                             GCVEC    87
      V(1,I) = G                                                        GCVEC    88
      V(2,I) = H                                                        GCVEC    89
  160 NORM = NORM + V(1,I)**2 + V(2,I)**2                               GCVEC    90
      NORM = SQRT ( NORM )                                              GCVEC    91
      IF ( LVEC .EQ  0 )      GO TO 2                                   GCVEC    92
         WRITE (ITAPEW,20)  ITER8, NORM, ( V(1,I), V(2,I), S(1,I),      GCVEC    93
     1                      S(2,I),  I=1,M)                             GCVEC    94
    2 CONTINUE                                                          GCVEC    95
      IF  ( NORM .LE. HURDLE )  GO TO 175                               GCVEC    96
      DO  170   I = 1, M                                                GCVEC    97
      S(1,I) = S(1,I) / NORM                                            GCVEC    98
      S(2,I) = S(2,I) / NORM                                            GCVEC    99
      V(1,I) = V(1,I) / NORM                                            GCVEC   100
  170 V(2,I) = V(2,I) / NORM                                            GCVEC   101
      GO TO 500                                                         GCVEC   102
C                                                                       GCVEC   103
  175 IF ( ITER8 .GT. 10 )   GO TO 490                                  GCVEC   104
      DO  180   I = 1, M                                                GCVEC   105
      SUM(1) = S(1,I)  +  MU * V(1,I)  -  NU * V(2,I)                   GCVEC   106
      SUM(2) = S(2,I)  +  MU * V(2,I)  +  NU * V(1,I)                   GCVEC   107
      CALL COMSCA ( P(1,I), V, SUM, M, MID, 1 )                         GCVEC   108
      S(1,I) = - SUM(1)                                                 GCVEC   109
  180 S(2,I) = - SUM(2)                                                 GCVEC   110
      CALL CLUSAL ( F, S, M, MID, IT, KEY )                             GCVEC   111
      ITER8 = ITER8 + 1                                                 GCVEC   112
      GO TO 150                                                         GCVEC   113
  490  WRITE (ITAPEW,10)  LAMBDA                                        GCVEC   114
C                                                                       GCVEC   115
```

```
      SUBROUTINE GCVEC ( P, Q, LAMBDA, M, MID, IT, V, S, F, ITER8 )       GCVEC    2
C                                                                         GCVEC    3
C                                                                         GCVEC    4
C  EIGENVECTORS OF THE M BY M SYSTEM                                      GCVEC    5
C                                                                         GCVEC    6
C    ( LAMBDA**2 * I  +  LAMBDA * P  +  Q ) * V  =  O                     GCVEC    7
C                                                                         GCVEC    8
C  WITH COMPLEX P AND Q.  IT IS ASSUMED THAT P AND Q ARE STORED           GCVEC    9
C   IN (COMPLEX) ARRAYS OF DIMENSION (MID,MID).  LAMBDA IS THE EIGEN-     GCVEC   10
C   VALUE ESTIMATE AND V IS THE VECTOR CALCULATED BY GCVEC ( USING        GCVEC   11
C   THE INVERSE POWER METHOD ).  IT ARRAY IS USED FOR SCRATCH AND MUST    GCVEC   12
C   HAVE DIMENSION AT LEAST 2*M.   S IS A (COMPLEX) SCRATCH VECTOR        GCVEC   13
C   OF DIMENSION AT LEAST M AND F IS A (COMPLEX) SCRATCH ARRAY OF         GCVEC   14
C   DIMENSION (MID,MID).  ITER8 GIVES THE NUMBER OF ITERATIONS NEEDED     GCVEC   15
C   TO FIND THE VECTOR.  10 ITERATIONS ARE ALLOWED (2 IS USUALLY ENOUGH) GCVEC   16
C   AND FAILURE IS INDICATED BY ITER8 = 11 (AND ALSO BY A PRINTED         GCVEC   17
C   MESSAGE. )                                                            GCVEC   18
C                                                                         GCVEC   19
C                                                                         GCVEC   20
C                                                                         GCVEC   21
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       GCVEC   22
C     DOUBLE PRECISION SUM                                                GCVEC   23
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS          GCVEC   24
C                                                                         GCVEC   25
      DIMENSION   P(2,1), Q(2,1), IT(1), V(2,1), S(2,1), F(2,1)           GCVEC   26
      DIMENSION ITAPES(50)                                                GCVEC   27
      COMPLEX LAMBDA, TARGET, CDAT                                        GCVEC   28
      DIMENSION SUM(2)                                                    GCVEC   29
      REAL    MU, NU, NORM                                                GCVEC   30
      COMMON  /DETAIL/ EPS , LVEC                                         GCVEC   31
      COMMON / CTAPES / ITAPES                                            GCVEC   32
C                                                                         GCVEC   33
C                                                                         GCVEC   34
      ITAPEW = ITAPES(6)                                                  GCVEC   35
C                                                                         GCVEC   36
C                                                                         GCVEC   37
      HURDLE   =  1.E7                                                    GCVEC   38
      EPS = 1.E-8                                                         GCVEC   39
      KEY = O                                                             GCVEC   40
      MID1 = MID + 1                                                      GCVEC   41
      MIDM = MID * M                                                      GCVEC   42
      MU = REAL(LAMBDA)                                                   GCVEC   43
      NU = AIMAG(LAMBDA)                                                  GCVEC   44
      II = 1                                                              GCVEC   45
      DO  110   I = 1, M                                                  GCVEC   46
      V(1,I) = O.                                                         GCVEC   47
      V(2,I) = O.                                                         GCVEC   48
C                                                                         GCVEC   49
C   THE RDM ARGUMENT IS NOT SIGNIFICANT AND IS NOT CHANGED.               GCVEC   50
C                                                                         GCVEC   51
      S(1,I) = RDM(NORM)                                                  GCVEC   52
  110 S(2,I) = O.                                                         GCVEC   53
C                                                                         GCVEC   54
C   GET  LAMBDA**2                                                        GCVEC   55
C                                                                         GCVEC   56
      RHO = MU * MU  -  NU * NU                                           GCVEC   57
      SIGMA = 2. * MU * NU                                                GCVEC   58
```

```
VARIABLES     SN  TYPE           RELOCATION
    0  LOC        INTEGER    ARRAY     F.P.        REFS       14      21   DEFINED       1
    0  LU         COMPLEX    ARRAY     F.P.        REFS       13      24        33      35   DEFINED       1
    0  M          INTEGER              F.P.        REFS       20      29        30      33   DEFINED       1
    0  MID        INTEGER              F.P.        REFS       15      24        33   DEFINED       1
  114  MID1       INTEGER                          REFS       30      34   DEFINED      15
  110  S          COMPLEX                          REFS       10      24        33   DEFINED      22      32
    0  Y          COMPLEX    ARRAY     F.P.        REFS       13      22        23      24      31      33
                                                DEFINED        1      23        24      35

EXTERNALS           TYPE   ARGS        REFERENCES
       COMSCA     COMPLEX    6              13         24         33

STATEMENT LABELS              DEF LINE    REFERENCES
    0  100                       24          20
   37  105                       29          19
   43  110                       31          37
    0  120          INACTIVE     38        2*37

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   13  100        I           20 24        22B                EXT REFS

STATISTICS
  PROGRAM LENGTH                 132B       90
          52000B CM USED
```

```
            SUBROUTINE CLUSAL(LU,Y,M,MID,LOC,KEY )                          CLUSAL     2
      C  MODIFIED CLUSOL.  ALLOWS SELECTIVE USE OF FORWARD AND BACKWARD     CLUSAL     3
      C  SOLUTIONS A LA TRIEQ.                                             CLUSAL     4
      C                                                                    CLUSAL     5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS  CLUSAL     6
      C     COMPLEX*16 S                                                   CLUSAL     7
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     CLUSAL     8
      C                                                                    CLUSAL     9
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS  CLUSAL    10
            COMPLEX S                                                      CLUSAL    11
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS  CLUSAL    12
      C                                                                    CLUSAL    13
            COMPLEX LU(1),Y(1),COMSCA,H                                    CLUSAL    14
            DIMENSION LOC(2,1)                                             CLUSAL    15
            MID1 = -(MID + 1)                                              CLUSAL    16
      C                                                                    CLUSAL    17
      C   FORWARD SOLUTION  (WITH INTERCHANGES)                            CLUSAL    18
      C                                                                    CLUSAL    19
            IF ( KEY .LT. O )  GO TO 105                                   CLUSAL    20
            DO 100  I = 1,M                                                CLUSAL    21
            L = LOC(2,I)                                                   CLUSAL    22
            S = Y(L)                                                       CLUSAL    23
            Y(L) = Y(I)                                                    CLUSAL    24
        100 Y(I) = COMSCA(LU(I),Y,S,I-1,MID,1)                             CLUSAL    25
            IF ( KEY .GT. O )  RETURN                                      CLUSAL    26
      C                                                                    CLUSAL    27
      C   BACK SOLUTION                                                    CLUSAL    28
      C                                                                    CLUSAL    29
        105 K = M                                                          CLUSAL    30
            KK1 = - M * MID1                                               CLUSAL    31
        110 H = Y(K)                                                       CLUSAL    32
            S = -H                                                         CLUSAL    33
            H = COMSCA(LU(KK1),Y(K+1),S,M-K,MID,1)                         CLUSAL    34
            KK1 = KK1 + MID1                                               CLUSAL    35
            Y(K) = -H / LU(KK1+1)                                          CLUSAL    36
            K = K - 1                                                      CLUSAL    37
            IF (K) 120,120,110                                             CLUSAL    38
        120 RETURN                                                         CLUSAL    39
            END                                                            CLUSAL    40
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  CLUSAL         1          25        38

VARIAbLES     SN  TYPE            RELOCATION
  112  H         COMPLEX                        REFS       13       32       35   DEFINED     31      33
  115  I         INTEGER                        REFS       21       23     3*24   DEFINED     20
  117  K         INTEGER                        REFS       31     2*33       35        36     37
                                             DEFINED       29       36
    O  KEY       INTEGER             F.P.       REFS       19       25  DEFINED         1
  120  KK1       INTEGER                        REFS       33       34       35   DEFINED     30      34
  116  L         INTEGER                        REFS       22       23  DEFINED        21
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
   151  230                        62         58
     0  240        INACTIVE        67         66
     0  250                        72         68
   200  260                        74         2*66
     0  270        INACTIVE        76         2*75
     0  280                        78         77
   225  290                        79         75
     0  300                        82         36
     0  310        INACTIVE        83
     0  320                        86         85
     0  340        INACTIVE        88

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   32   136     K1          31 35       22B               NOT INNER
   41   133     KJ          33 34        6B      INSTACK
   55   300     K1          36 82      157B               EXT REFS  NOT INNER
   65   140     IK          40 42       10B        OPT
  103   190     IK          46 57       36B               EXT REFS
  167   250     KJ          68 72        7B      INSTACK
  215   280     IK          77 78        7B      INSTACK
  244   320     KK          85 86        6B      INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DETAIL         2              0 DELTA  (1)              1 LVEC    (1)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       L1             1              0 EL      (1)

STATISTICS
  PROGRAM LENGTH                  355B      237
  CM LABELED COMMON LENGTH          2B        2
         52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
  315  I          INTEGER                          REFS        41        42   DEFINED        39        42
  316  IK         INTEGER                          REFS      2*41        50        51      2*53      2*78
                                                DEFINED       40        46        77
  320  I1         INTEGER                          REFS        47        49        51        53        56        57
                                                DEFINED       45        57
  321  J          INTEGER                          REFS        48        52   DEFINED        47
  307  KB         INTEGER                          REFS        40        46        51        79        80
                                                DEFINED       28        79
  314  KJ         INTEGER                          REFS      2*34        69        70   DEFINED        33        68
  306  KK         INTEGER                          REFS        59        74        76        86   DEFINED        27        80
                                                   85
  326  KK1        INTEGER                          REFS        75        77   DEFINED        74
  312  K1         INTEGER                          REFS        33        35        47        59        63        64        65
                                                   66        68        80   DEFINED        31        36
  322  L          INTEGER                          REFS        51   DEFINED        49
  311  LAST       INTEGER                          REFS        33        68        85   DEFINED        30
  325  LJ         INTEGER                          REFS        70        71        72   DEFINED        67        72
  324  LK         INTEGER                          REFS        60   DEFINED        59
    1  LVEC       INTEGER             DETAIL       REFS        15
  327  L1         INTEGER                          REFS        16        59        62        63        66        67        85
                                                DEFINED       56        84
    0  M          INTEGER             F.P.         REFS        20        21   DEFINED         1
    0  MID        INTEGER             F.P.         REFS        30        33        51        68        72        79        81
                                                   84   DEFINED         1
  303  N          INTEGER                          REFS        29        30        31        36   DEFINED        20
    0  NIX        INTEGER             F.P.      DEFINED        1        18
  310  NK         INTEGER                          REFS        40        46        75        77        81
                                                DEFINED       29        81
  323  P          REAL                             REFS        54        55   DEFINED        53
  277  SUM        COMPLEX                          REFS        10        51   DEFINED        50
  317  TOL        REAL                             REFS        58        60   DEFINED        43

EXTERNALS            TYPE    ARGS        REFERENCES
       COMSCA       COMPLEX    6              13        51

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE   REFERENCES
       ABS          REAL       1  INTRIN                2*34      2*41      2*53
       AIMAG        REAL       1  INTRIN                  34        41        53
       AMAX1        REAL       0  INTRIN                  34        41
       CAP          REAL       1   SF           17        34        41        53
       IABS         INTEGER    1  INTRIN                  20
       REAL         REAL       1  INTRIN                  34        41        53

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100       INACTIVE        22          21
   16  110                       24        2*21
   20  120                       25          23
    0  130       INACTIVE        27
    0  133                       34          33
    0  136                       35          31
    0  140                       42          40
    0  150       INACTIVE        49        2*48
  110  160                       50          48
    0  170       INACTIVE        53        2*52
    0  180       INACTIVE        55          54
  135  190                       57          46        52      2*54
    0  200       INACTIVE        59        2*58
```

```
          IF ( G - TOL )  200, 200, 230                              CDAT      59
      200 LK = KK + L1 - K1                                          CDAT      60
          A(LK) = TOL                                                CDAT      61
          D = O.                                                     CDAT      62
      230 G = ENT(1,L1)                                              CDAT      63
          ENT(1,L1) = ENT(1,K1)                                      CDAT      64
          ENT(1,K1) = G                                              CDAT      65
          ENT(2,K1) = EL                                             CDAT      66
          IF (L1 - K1) 260,260,240                                   CDAT      67
      240 LJ = L1                                                    CDAT      68
          DO 250  KJ = K1,LAST,MID                                   CDAT      69
          H = A(KU)                                                  CDAT      70
          A(KJ) = A(LJ)                                              CDAT      71
          A(LJ) = H                                                  CDAT      72
      250 LJ = LJ + MID                                              CDAT      73
          D = -D                                                     CDAT      74
      260 KK1 = KK + 1                                               CDAT      75
          IF (KK1 - NK) 270,270,290                                  CDAT      76
      270 H = -A(KK)                                                 CDAT      77
          DO 280  IK = KK1,NK                                        CDAT      78
      280 A(IK) = A(IK) / H                                          CDAT      79
      290 KB = KB + MID                                              CDAT      80
          KK = KB + K1                                               CDAT      81
          NK = NK + MID                                              CDAT      82
      300 CONTINUE                                                   CDAT      83
      310 H = D                                                      CDAT      84
          L1 = MID + 1                                               CDAT      85
          DO 320  KK = 1,LAST,L1                                     CDAT      86
      320 H = H * A(KK)                                              CDAT      87
          CDAT = H                                                   CDAT      88
      340 RETURN                                                     CDAT      89
          END                                                        CDAT      90
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
   5  CDAT            1           88

VARIABLES      SN  TYPE            RELOCATION
   O  A            COMPLEX   ARRAY      F.P.      REFS       13     14    2*34    2*41       50    2*51    2*53
                                                     69      70     76      78      86  DEFINED       1      51
                                                     60      70     71      78
 275  CDAT         COMPLEX                        DEFINED    87
 304  D            REAL                              REFS    73     83  DEFINED     22       24      61      73
   O  DELTA        REAL                 DETAIL       REFS    15     25  DEFINED     19
 327  EL           REAL                              REFS    16     65
   O  ENT          REAL      ARRAY      F.P.         REFS    14     41      53      62       63
                                                  DEFINED     1     35      63      64       65
 305  EPS          REAL                              REFS  2*26     43  DEFINED     25       26
 313  G            REAL                              REFS    34     35      41      43       54      58      64
                                                  DEFINED    32     34      38      41       44      55      62
 301  H            COMPLEX                           REFS    13     71      78      86       87
                                                  DEFINED    69     76      83      86
```

```
      COMPLEX FUNCTION CDAT (A,M,MID,ENT,NIX)                          CDAT   2
C  MODIFIED CDET.  ALWAYS YIELDS A FACTORIZATION (EVEN IF A IS SING. ) CDAT   3
C  TRIANGULAR DECOMPOSITION WITH OPTIONAL DETERMINANT CALCULATION.     CDAT   4
C                                                                      CDAT   5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    CDAT   6
C     COMPLEX*16 SUM                                                   CDAT   7
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       CDAT   8
C                                                                      CDAT   9
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS    CDAT  10
      COMPLEX SUM                                                      CDAT  11
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       CDAT  12
C                                                                      CDAT  13
      COMPLEX A, H, COMSCA                                             CDAT  14
      DIMENSION  A(1), ENT(2,1)                                        CDAT  15
      COMMON  /DETAIL/ DELTA , LVEC                                    CDAT  16
      EQUIVALENCE (L1,EL)                                              CDAT  17
      CAP(H) = ABS(REAL(H)) + ABS( AIMAG(H))                           CDAT  18
      NIX = 0                                                          CDAT  19
      DELTA    =  1.E-10                                               CDAT  20
      N = IABS(M)                                                      CDAT  21
      IF (M)  100, 110, 110                                            CDAT  22
  100 D = 0.                                                           CDAT  23
      GO TO 120                                                        CDAT  24
  110 D = 1.                                                           CDAT  25
  120 EPS = DELTA                                                      CDAT  26
      IF (EPS .LT. 0.  .OR.  EPS .GT. 1.E-5)  EPS = 3.E-7              CDAT  27
  130 KK = 1                                                           CDAT  28
      KB = 1                                                           CDAT  29
      NK = N                                                           CDAT  30
      LAST = N*MID                                                     CDAT  31
      DO 136  K1 = 1,N                                                 CDAT  32
      G = 1.E-70                                                       CDAT  33
      DO 133  KJ = K1,LAST,MID                                         CDAT  34
  133 G = AMAX1(G,CAP(A(KJ)))                                          CDAT  35
  136 ENT(1,K1) = 1. / G                                               CDAT  36
      DO 300  K1 = 1,N                                                 CDAT  37
C   SET G TO MAX. ELT. OF (IMPLICITLY) SCALED ORIGINAL COLUMN K.       CDAT  38
      G = 0.                                                           CDAT  39
      I = 1                                                            CDAT  40
      DO 140  IK = KB,NK                                               CDAT  41
      G = AMAX1(G,ENT(1,I)*CAP(A(IK)))                                 CDAT  42
  140 I = I + 1                                                        CDAT  43
      TOL = G * EPS  +  1.E-12                                         CDAT  44
      G = 0.                                                           CDAT  45
      I1 = 1                                                           CDAT  46
      DO 190  IK = KB,NK                                               CDAT  47
      J = I1 - K1                                                      CDAT  48
      IF (J) 150,150,160                                               CDAT  49
  150 L = I1 - 1                                                       CDAT  50
  160 SUM = A(IK)                                                      CDAT  51
      A(IK) = COMSCA(A(I1),A(KB),SUM,L,MID,1)                          CDAT  52
      IF (J)  190, 170, 170                                            CDAT  53
  170 P = CAP(A(IK)) * ENT(1,I1)                                       CDAT  54
      IF (P - G)  190, 190,180                                         CDAT  55
  180 G = P                                                            CDAT  56
      L1 = I1                                                          CDAT  57
  190 I1 = I1 + 1                                                      CDAT  58
```

```
  1              SUBROUTINE ADIV ( A , B , C , M , MID , IT )                       ADIV        2
           C                                                                        ADIV        3
           C    PREMULTIPLIES THE COMPLEX MATRICES  B  AND  C  BY  THE INVERSE OF   ADIV        4
           C      THE COMPLEX ARRAY A. B AND C ARE SQUARE OF ORDER M, AND           ADIV        5
  5        C    ARE STORED IN COMPLEX DOUBLE ARRAYS OF DIMENSION (MID,*).           ADIV        6
           C                                                                        ADIV        7
                 DIMENSION  A(2,1) , B(2,1) , C(2,1) , IT(1)                        ADIV        8
                 CALL CDAT ( A,-M,MID,IT,NIX )                                      ADIV        9
                 LAST     =  M * MID                                                ADIV       10
 10              DO 100  INDEX = 1,LAST,MID                                         ADIV       11
                 CALL CLUSAL (A,B(1,INDEX),M,MID,IT,0)                              ADIV       12
             100 CALL CLUSAL (A,C(1,INDEX),M,MID,IT,0)                              ADIV       13
                 RETURN                                                             ADIV       14
                 END                                                                ADIV       15
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  ADIV           1           13

VARIABLES      SN  TYPE            RELOCATION
    0  A           REAL       ARRAY     F.P.        REFS          7        8       11        12   DEFINED       1
    0  B           REAL       ARRAY     F.P.        REFS          7       11  DEFINED         1
    0  C           REAL       ARRAY     F.P.        REFS          7       12  DEFINED         1
   75  INDEX       INTEGER                          REFS         11       12  DEFINED        10
    0  IT          INTEGER    ARRAY     F.P.        REFS          7        8       11        12   DEFINED       1
   74  LAST        INTEGER                          REFS         10  DEFINED        9
    0  M           INTEGER              F.P.        REFS          8        9       11        12   DEFINED       1
    0  MID         INTEGER              F.P.        REFS          8        9       10        11        12
                                                 DEFINED          1
   73  NIX      *  INTEGER                          REFS          8

EXTERNALS           TYPE    ARGS       REFERENCES
       CDAT                   5             8
       CLUSAL                 6            11        12

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100                       12          10

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   21  100       INDEX       10 12        23B               EXT REFS

STATISTICS
  PROGRAM LENGTH              112B       74
         52000B CM USED
```

```
STATISTICS
  PROGRAM LENGTH              63B      51
        52000B CM USED
```

```
              SUBROUTINE ORIENT ( V, N )                                ORIENT       2
              DIMENSION  V(2,N)                                         ORIENT       3
              TOP = 0.                                                  ORIENT       4
              EUCLID    =  0.0                                          ORIENT       5
              L = 1                                                     ORIENT       6
              DO 110  I = 1, N                                          ORIENT       7
              SIZE = V(1,I)**2 + V(2,I)**2                              ORIENT       8
              IF ( SIZE .LE. TOP )          GO TO 110                   ORIENT       9
              L         =  I                                            ORIENT      10
              TOP = SIZE                                                ORIENT      11
          110 EUCLID    =  EUCLID + SIZE                                ORIENT      12
              R         =  SQRT ( TOP * EUCLID )                        ORIENT      13
              X = V(1,L) / R                                            ORIENT      14
              Y = -V(2,L) / R                                           ORIENT      15
              DO 120  I = 1, N                                          ORIENT      16
              G = V(1,I)                                                ORIENT      17
              H = V(2,I)                                                ORIENT      18
              V(1,I) = G * X  -  H * Y                                  ORIENT      19
          120 V(2,I) = G * Y  +  H * X                                  ORIENT      20
              RETURN                                                    ORIENT      21
              END                                                       ORIENT      22
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  ORIENT           1          20

VARIABLES      SN  TYPE            RELOCATION
   52  EUCLID     REAL                                 REFS        11        12   DEFINED       4        11
   61  G          REAL                                 REFS        18        19   DEFINED      16
   62  H          REAL                                 REFS        18        19   DEFINED      17
   54  I          INTEGER                              REFS       2*7         9        16      17        18        19
                                                    DEFINED         6        15
   53  L          INTEGER                              REFS        13        14   DEFINED       5         9
    0  N          INTEGER               F.P.           REFS         2         6        15   DEFINED         1
   56  R          REAL                                 REFS        13        14   DEFINED      12
   55  SIZE       REAL                                 REFS         8        10        11   DEFINED         7
   51  TOP        REAL                                 REFS         8        12   DEFINED       3        10
    0  V          REAL        ARRAY     F.P.           REFS         2       2*7        13      14        16        17
                                                    DEFINED         1        18        19
   57  X          REAL                                 REFS        18        19   DEFINED      13
   60  Y          REAL                                 REFS        18        19   DEFINED      14

EXTERNALS           TYPE    ARGS        REFERENCES
       SQRT       REAL       1 LIBRARY      12

STATEMENT LABELS             DEF LINE    REFERENCES
    21  110                     11          6          8
     0  120                     19         15

LOOPS   LABEL      INDEX      FROM-TO     LENGTH     PROPERTIES
   14   110        I            6 11        10B         OPT
   40   120        I           15 19         7B       INSTACK
```

```
VARIABLES      SN  TYPE          RELOCATION
     O  KR         INTEGER            F.P.      REFS        3   DEFINED        1
   143  L          INTEGER                      REFS       16        18       19   DEFINED      13
     O  N          INTEGER            F.P.      REFS        5        22       28        30  DEFINED       1
     O  X          COMPLEX   ARRAY    F.P.      REFS        3        27       29   DEFINED       1       23
   134  XY         COMPLEX                      REFS        3        20       29        30  DEFINED      18       27

EXTERNALS          TYPE    ARGS         REFERENCES
       CABS        REAL       1 LIBRARY      11

STATEMENT LABELS                DEF LINE    REFERENCES
    27  2                             15         9        12
    51  6                             22         6        16
     O  7                             20        17
     O  8                             23        22
     O  9                             29        28
     O  10                            30        25
    12  11                             6        32
   132  13                            33         6        24
     O  15          INACTIVE           7         6

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
   17  2         I              9 15        13B               EXT REFS
   42  7         J             17 20         6B       INSTACK
   57  8         I             22 23         3B       INSTACK
   66  10        J             25 30        42B               NOT INNER
  110  9         I             28 29         7B       INSTACK

STATISTICS
  PROGRAM LENGTH                  160B       112
          52000B CM USED
```

```
          SUBROUTINE JORCOM (A,N,X,KR,KC)                                  JORCOM    2
C                                                                          JORCOM    3
          COMPLEX          A(KR,1) ,        X(1) ,         XY              JORCOM    4
C                                                                          JORCOM    5
          K         =  N + 1                                               JORCOM    6
       11 IF ( K - 1 )  13 , 6 , 15                                        JORCOM    7
       15 D         =  0.0                                                 JORCOM    8
C                                                                          JORCOM    9
          DO 2  I = 2,K                                                    JORCOM   10
          II        =  I - 1                                               JORCOM   11
          C1        =  CABS (A(II,1))                                      JORCOM   12
          IF ( C1 .LE. D )        GO TO 2                                  JORCOM   13
          L         =  II                                                  JORCOM   14
          D         =  C1                                                  JORCOM   15
        2 CONTINUE                                                         JORCOM   16
          IF ( L .EQ. 1 )         GO TO 6                                  JORCOM   17
          DO 7  J = 1,K                                                    JORCOM   18
          XY        =  A(L,J)                                              JORCOM   19
          A(L,J)    =  A(1,J)                                              JORCOM   20
        7 A(1,J)    =  XY                                                  JORCOM   21
C                                                                          JORCOM   22
        6 DO 8  I = 1,N                                                    JORCOM   23
        8 X(I)      =  A(I,1)                                              JORCOM   24
          IF ( K .EQ. 1 )         GO TO 13                                 JORCOM   25
          DO 1C  J = 2,K                                                   JORCOM   26
          IJ        =  J - 1                                               JORCOM   27
          XY        =  A(1,J) / X(1)                                       JORCOM   28
          DO 9   I = 2,N                                                   JORCOM   29
        9 A(I-1,IJ)  =  A(I,J) - X(I)*XY                                   JORCOM   30
       10 A(N,IJ)   =  XY                                                  JORCOM   31
          K         =  K - 1                                               JORCOM   32
          GO TO 11                                                         JORCOM   33
       13 RETURN                                                           JORCOM   34
          END                                                              JORCOM   35
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  JORCOM         1            33

VARIABLES      SN  TYPE             RELOCATION
    0  A           COMPLEX    ARRAY      F.P.     REFS        3      11      18      19      23      27      29
                                               DEFINED        1      19      20      29      30
  142  C1          REAL                           REFS       12      14  DEFINED      11
  137  D           REAL                           REFS       12  DEFINED       7      14
  140  I           INTEGER                        REFS       10    2*23    3*29  DEFINED       9      22      28
  141  II          INTEGER                        REFS       11      13  DEFINED      10
  145  IJ          INTEGER                        REFS       29      30  DEFINED      26
  144  J           INTEGER                        REFS       18    2*19      20      26      27      29
                                               DEFINED       17      25
  136  K           INTEGER                        REFS        6       9      17      24      25      31
                                               DEFINED        5      31
    0  KC          INTEGER   *UNUSED     F.P.  DEFINED        1
```

```
VARIABLES      SN   TYPE           RELOCATION
  ..   SIGMA        REAL                                  REFS       66   DEFINED      57
 145   SUM          REAL          ARRAY                   REFS       28       107     108      109    DEFINED     105     106
 ...   TARGET       COMPLEX                               REFS       27   DEFINED      72
  0    V            REAL          ARRAY      F.P.         REFS       25        85      86     2*89       2*92      99     100
                                                          2*105   2*106       107  DEFINED       1         46      47      87
                                                            88       99       100

     VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE     ARGS         REFERENCES
     CDAT           COMPLEX    5               27          72
     CLUSAL                    6              110
     COMSCA                    6              107
     RDM            REAL       1               51
     SQRT           REAL       1 LIBRARY       30

INLINE FUNCTIONS    TYPE     ARGS          DEF LINE  REFERENCES
     AIMAG          REAL       1  INTRIN                43
     REAL           REAL       1  INTRIN                42

STATEMENT LABELS              DEF LINE     REFERENCES
  147   2                          94          91
  303   10        FMT             118         113
  312   20        FMT             119          92
    0   110                        52          45
    0   120                        64          62
    0   130                        67          61
  101   150                        81         112
    0   160                        89          82
    0   170                       100          96
  167   175                       103          95
    0   180                       109         104
  232   490                       113         103
  234   500                       121         101

LOOPS   LABEL     INDEX      FROM-TO      LENGTH      PROPERTIES
   23   110       I           45  52        10B                   EXT REFS
   40   130       I           61  67        30B                   NOT INNER
   46   120       IJ          62  64        10B           OPT
  111   160       I           82  89        14B           OPT
  133             I           92  92        13B                   EXT REFS
  160   170       I           96  100        5B         INSTACK
  173   180       I          104  109       24B                   EXT REFS

COMMON BLOCKS     LENGTH      MEMBERS - BIAS NAME(LENGTH)
       DETAIL          2                 0 EPS     (1)              1 LVEC    (1)
       CTAPES         50                 0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                     377B        255
  CM LABELED COMMON LENGTH            64B         52
          52000B CM USED
```

```
      SUBROUTINE GRVEC ( P, LAMBDA, M, MID, IT, G, H, F, ITER8 )         GRVEC   2
C                                                                        GRVEC   3
C                                                                        GRVEC   4
C  ROW EIGENVECTORS OF THE SYSTEM                                        GRVEC   5
C                                                                        GRVEC   6
C    G (TRANSPOSE) * ( LAMBDA**2 * I  +  LAMBDA * P  +  Q )  =  O        GRVEC   7
C                                                                        GRVEC   8
C  WITH COMPLEX P AND Q. IT IS ASSUMED THAT THE CORRESPONDING COLUMN     GRVEC   9
C  VECTOR HAS ALREADY BEEN CALCULATED VIA GCVEC AND THAT THE VARIABLES   GRVEC  10
C  LAMBDA, M, AND MID AND THE ARRAYS P, IT, AND F ARE UNCHANGED FROM     GRVEC  11
C  GCVEC.  G IS THE VECTOR COMPUTED BY GRVEC, AND H IS A (COMPLEX)       GRVEC  12
C  SCRATCH VECTOR.  ITER8 IS USED IN THE SAME SENSE AS IN GCVEC.         GRVEC  13
C                                                                        GRVEC  14
C                                                                        GRVEC  15
C                                                                        GRVEC  16
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      GRVEC  17
C     DOUBLE PRECISION SUM                                               GRVEC  18
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         GRVEC  19
C                                                                        GRVEC  20
      DIMENSION SUM(2)                                                   GRVEC  21
      DIMENSION   P(2,1), IT(2,1), G(2,1), H(2,1), F(2,1)                GRVEC  22
      DIMENSION ITAPES(50)                                               GRVEC  23
      COMMON / CTAPES / ITAPES                                           GRVEC  24
      COMMON /DETAIL / EPS , LVEC                                        GRVEC  25
      COMPLEX LAMBDA                                                     GRVEC  26
      REAL    MU, NU, NORM                                               GRVEC  27
C                                                                        GRVEC  28
C                                                                        GRVEC  29
      ITAPEW = ITAPES(6)                                                 GRVEC  30
C                                                                        GRVEC  31
C                                                                        GRVEC  32
      HURDLE   =   1.E7                                                  GRVEC  33
      KEY = O                                                            GRVEC  34
      MID1 = MID + 1                                                     GRVEC  35
      MIDM = MID * M                                                     GRVEC  36
      MU = REAL(LAMBDA)                                                  GRVEC  37
      NU = AIMAG(LAMBDA)                                                 GRVEC  38
      DO  110   I = 1, M                                                 GRVEC  39
      G(1,I) = O.                                                        GRVEC  40
      G(2,I) = O.                                                        GRVEC  41
C                                                                        GRVEC  42
C   THE RDM ARGUMENT IS NOT SIGNIFICANT AND IS NOT CHANGED.              GRVEC  43
C                                                                        GRVEC  44
      H(1,I) = RDM( NORM )                                               GRVEC  45
  110 H(2,I) = O.                                                        GRVEC  46
C                                                                        GRVEC  47
C                                                                        GRVEC  48
C                                                                        GRVEC  49
      ITER8 = O                                                          GRVEC  50
  120 NORM = O.                                                          GRVEC  51
      IB = 1                                                             GRVEC  52
      DO 130  I = 1, M                                                   GRVEC  53
      SUM(1) = G(1,I)  +  MU * H(1,I)  -  NU * H(2,I)                    GRVEC  54
      SUM(2) = G(2,I)  +  MU * H(2,I)  +  NU * H(1,I)                    GRVEC  55
      CALL COMSCA ( P(1,IB), H, SUM, M, 1, 1 )                           GRVEC  56
      G(1,I) = SUM(1)                                                    GRVEC  57
      G(2,I) = SUM(2)                                                    GRVEC  58
```

```
      NORM = NORM + H(1,I)**2 + H(2,I)**2                                GRVEC      59
  130 IB = IB + MID                                                      GRVEC      60
      NORM = SQRT ( NORM )                                               GRVEC      61
      DO 140  I = 1, M                                                   GRVEC      62
      S = G(1,I)                                                         GRVEC      63
      G(1,I) = H(1,I)                                                    GRVEC      64
      H(1,I) = S                                                         GRVEC      65
      S = G(2,I)                                                         GRVEC      66
      G(2,I) = H(2,I)                                                    GRVEC      67
  140 H(2,I) = S                                                         GRVEC      68
      IF ( LVEC .EQ. 0 )      GO TO 2                                    GRVEC      69
      WRITE (ITAPEW,20) ITER8,NORM,(H(1,I),H(2,I),G(1,I),G(2,I),I=1,M)   GRVEC      70
    2 CONTINUE                                                           GRVEC      71
      IF ( NORM .GE. HURDLE )  GO TO 500                                 GRVEC      72
      IF ( ITER8 .GT. 10 )   GO TO 490                                   GRVEC      73
      DO 150  I = 1, M                                                   GRVEC      74
      H(1,I) = -MU * G(1,I)  +  NU * G(2,I)  -  H(1,I)                   GRVEC      75
  150 H(2,I) = -MU * G(2,I)  -  NU * G(1,I)  -  H(2,I)                   GRVEC      76
C                                                                        GRVEC      77
C  CLUTSL IS LIKE CLUSAL, BUT SOLVES SYSTEMS OF THE FORM                 GRVEC      78
C                                                                        GRVEC      79
C    A (TRANSPOSE) * X  =  Y   RATHER THAN THOSE OF THE FORM             GRVEC      80
C                                                                        GRVEC      81
C                  A * X  =  Y.                                          GRVEC      82
C                                                                        GRVEC      83
C  IN EACH CASE, CDAT RECEIVES ( AND FACTORS ) THE A MATRIX.             GRVEC      84
C                                                                        GRVEC      85
      CALL CLUTSL ( F, H, M, MID, IT, KEY)                               GRVEC      86
      ITER8 = ITER8 + 1                                                  GRVEC      87
      GO TO 120                                                          GRVEC      88
C                                                                        GRVEC      89
C                                                                        GRVEC      90
  490 WRITE (ITAPEW,10)  LAMBDA                                          GRVEC      91
C                                                                        GRVEC      92
C                                                                        GRVEC      93
C FORMATS                                                                GRVEC      94
C                                                                        GRVEC      95
   10 FORMAT (41HONO CONVERGENCE IN 10 TRIES WITH LAMBDA =,1P2E15.7 )    GRVEC      96
   20 FORMAT ( 8HOITER8 =, I2, 7H NORM =,G16.7 / (4G20.7))               GRVEC      97
C                                                                        GRVEC      98
  500 RETURN                                                             GRVEC      99
      END                                                                GRVEC     100
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  GRVEC          1          98

VARIABLES     SN  TYPE             RELOCATION
   O  EPS         REAL                 DETAIL     REFS        24
   O  F           REAL        ARRAY    F.P.       REFS        21       85    DEFINED        1
   O  G           REAL        ARRAY    F.P.       REFS        21       53       54         62        65      2*69      2*74
                                                    2*75   DEFINED        1       39         40        56        57        63
```

```
VARIABLES      SN  TYPE             RELOCATION
                                                66
    0  H          REAL      ARRAY      F.P.   REFS       21      2*53     2*54       55     2*58       63      66
                                                2*69       74        75       85  DEFINED        1       44      45
                                                64       67        74       75
  247  HURDLE     REAL                         REFS       71   DEFINED      32
  253  I          INTEGER                      REFS       39        40       44       45     3*53     3*54      56
                                                57     2*58        62     2*63       64       65     2*66      67
                                                4*69     4*74      4*75  DEFINED       38       52       61      69
                                                73
  254  IB         INTEGER                      REFS       55        59  DEFINED       51       59
    0  IT         INTEGER   ARRAY      F.P.    REFS       21        85  DEFINED        1
    0  ITAPES     INTEGER   ARRAY      CTAPES  REFS       22        23       29
  246  ITAPEW     INTEGER                    DEFINED      29   I/O REFS      69       90
    0  ITER8      INTEGER              F.P.    REFS       69        72       86  DEFINED        1       49      86
  250  KEY        INTEGER                      REFS       85   DEFINED      33
    0  LAMBDA     COMPLEX              F.P.    REFS       25        36       37       90  DEFINED        1
    1  LVEC       INTEGER              DETAIL  REFS       24        68
    0  M          INTEGER              F.P.    REFS       35        38       52       55       61       69      73
                                                85  DEFINED         1
    0  MID        INTEGER              F.P.    REFS       34        35       59       85  DEFINED        1
  252  MIDM     * INTEGER                    DEFINED      35
  251  MID1     * INTEGER                    DEFINED      34
  243  MU         REAL                         REFS       26        53       54       74       75
                                             DEFINED      36
  245  NORM       REAL                         REFS       26        44       58       60       69       71
                                             DEFINED      50        58       60
  244  NU         REAL                         REFS       26        53       54       74       75
                                             DEFINED      37
    0  P          REAL      ARRAY      F.P.    REFS       21        55  DEFINED        1
  255  S          REAL                         REFS       64        67  DEFINED       62       65
  256  SUM        REAL      ARRAY              REFS       20        55       56       57  DEFINED       53      54
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS          REFERENCES
       CLUTSL                6               85
       COMSCA                6               55
       RDM        REAL       1               44
       SQRT       REAL       1 LIBRARY       60

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE   REFERENCES
       AIMAG      REAL       1  INTRIN                 37
       REAL       REAL       1  INTRIN                 36

STATEMENT LABELS             DEF LINE     REFERENCES
  124  2                        70            68
  225  10        FMT            95            90
  234  20        FMT            96            69
    0  110                      45            38
   32  120                      50            87
    0  130                      59            52
    0  140                      67            61
    0  150                      75            73
  163  490                      90            72
  165  500                      98            71
```

```
LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   21   110      I           38 45       10B              EXT REFS
   35   130      I           52 59       31B              EXT REFS
   76   140      I           61 67        5B      INSTACK
  110            I           69 69       13B              EXT REFS
  137   150      I           73 75        7B      INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES        50                 0 ITAPES (50)
       DETAIL         2                 0 EPS     (1)                1 LVEC    (1)

STATISTICS
  PROGRAM LENGTH                     302B      194
  CM LABELED COMMON LENGTH            64B       52
          52000B CM USED
```

```
      SUBROUTINE CLUTSL ( LU, Y, M, MID, LOC, KEY )
C
C  SOLVES THE COMPLEX LINEAR SYSTEM   AT * X  =  Y,  WHERE AT REPRESENTS
C  A TRANSPOSE  AND THE LU ARRAY CONTAINS THE TRIANGULAR FACTORS OF A,
C  L BELOW THE DIAG. AND U ON AND ABOVE.  THIS IS THE ARRANGEMENT PRO-
C  DUCED BY CDAT, WHICH ALSO PUTS INTERCHANGE INFO INTO LOC.
C
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C     COMPLEX*16 S
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      COMPLEX S
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
      COMPLEX LU(1),Y(1),COMSCA,H
      DIMENSION LOC(2,1)
      MID1  =  MID + 1
      IF  (KEY .LT. O )  GO TO 110
C
C   FORWARD SOLUTION
C
      IB    =  1
      II    =  1
      DO 100  I = 1,M
      H     =  Y(I)
      S     =  -H
      Y(I)  =  -COMSCA( LU(IB), Y, S, I-1, 1, 1 )  /  LU(II)
      IB    =  IB + MID
  100 II    =  II + MID1
      IF ( KEY .GT. O )  RETURN
C
C   BACK SOLUTION
C
  110 K     =  M
      KK1   =  M * MID1  -  MID  +  1
  120 S     =  Y(K)
      Y(K)  =  COMSCA( LU(KK1), Y(K+1), S, M-K, 1, 1 )
      KK1   =  KK1 - MID1
      K     =  K - 1
      IF  ( K )  130, 130, 120
  130 K     =  M
  140 L     =  LOC(2,K)
      H     =  Y(K)
      Y(K)  =  Y(L)
      Y(L)  =  H
      K     =  K - 1
      IF  ( K )  150, 150, 140
  150 RETURN
      END
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  CLUTSL           1          32         50

VARIABLES      SN  TYPE            RELOCATION
  126  H           COMPLEX                          REFS         17         28         47   DEFINED         27         45
  133  I           INTEGER                          REFS         27       2*29    DEFINED         26
  131  IB          INTEGER                          REFS         29         30    DEFINED         24         30
  132  II          INTEGER                          REFS         29         31    DEFINED         25         31
  134  K           INTEGER                          REFS         38       3*39         41         42         44         45         46
                                                      48         49    DEFINED         36         41         43         48
    0  KEY         INTEGER                F.P.      REFS         20         32    DEFINED          1
  135  KK1         INTEGER                          REFS         39         40    DEFINED         37         40
  136  L           INTEGER                          REFS         46         47    DEFINED         44
    0  LOC         INTEGER    ARRAY       F.P.      REFS         18         44    DEFINED          1
    0  LU          COMPLEX    ARRAY       F.P.      REFS         17       2*29         39   DEFINED          1
    0  M           INTEGER                F.P.      REFS         26         36         37         39         43
                                                 DEFINED          1
    0  MID         INTEGER                F.P.      REFS         19         30         37   DEFINED          1
  130  MID1        INTEGER                          REFS         31         37         40   DEFINED         19
  124  S           COMPLEX                          REFS         14         29         39   DEFINED         28         38
    0  Y           COMPLEX    ARRAY       F.P.      REFS         17         27         29         38         39         45         46
                                                 DEFINED          1         29         39         46         47

EXTERNALS           TYPE   ARGS         REFERENCES
       COMSCA      COMPLEX   6                 17         29         39

STATEMENT LABELS                DEF LINE    REFERENCES
    0  100                          31          26
   46  110                          36          20
   53  120                          38          42
    0  130          INACTIVE        43        2*42
   75  140                          44          49
    0  150          INACTIVE        50        2*49

LOOPS  LABEL      INDEX      FROM-TO      LENGTH     PROPERTIES
   14  100        I            26 31        30B                EXT REFS

STATISTICS
  PROGRAM LENGTH                   147B       103
      52000B CM USED
```

```
      SUBROUTINE EIGM (RHOP,IR,IS)                                      EIGM   2
C                                                                       EIGM   3
C     EIGENVALUE MATRIX PROGRAM                                         EIGM   4
C                                                                       EIGM   5
CIBM  BEGINNING OF STATEMENTS ASSOCI'TED WITH IBM COMPUTER PROGRAMS     EIGM   6
C     COMPLEX*16 SUM                                                    EIGM   7
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        EIGM   8
C                                                                       EIGM   9
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     EIGM  10
      COMPLEX SUM                                                       EIGM  11
      COMPLEX BECS(40,40),BBECS(40,40)                                  EIGM  12
      COMMON /BCOM/ BECS,BBECS                                          EIGM  13
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        EIGM  14
C                                                                       EIGM  15
      DIMENSION LOC(40), NIND(40), WW(40,40), OMG(40), OMGA(40)         EIGM  16
      DIMENSION ITAPES(50), LC(40)                                      EIGM  17
      DIMENSION VBO(30), RVBO(15)                                       EIGM  18
C                                                                       EIGM  19
      COMPLEX B(40,40), DETAD(40,40), BB(40,40), CC(40,40)              EIGM  20
      COMPLEX AIB(40,40), Q(40,40), QAA(40,40), COMSCA                  EIGM  21
C                                                                       EIGM  22
      COMMON /FLEXT / BB, OMGA, RHO, VB                                 EIGM  23
      COMMON /MODD  / B, DETAD, WW, OMG, NC                             EIGM  24
      COMMON /FITR  / NOMI, NIND                                        EIGM  25
      COMMON /FLUTAN/ FMACH ,BETA   ,VBO    ,RVBO   ,NRVBO              EIGM  26
      COMMON / CTAPES / ITAPES                                          EIGM  27
      COMMON /FLUTV / VL, VH, FLO, FHI, IE, NQZ, NVTOT                  EIGM  28
      COMMON /COMA  / LC,BR                                             EIGM  29
C                                                                       EIGM  30
      EQUIVALENCE (Q(1,1),AIB(1,1))                                     EIGM  31
      EQUIVALENCE (B(1,1),QAA(1,1))                                     EIGM  32
      EQUIVALENCE (BB(1,1),CC(1,1))                                     EIGM  33
C                                                                       EIGM  34
CCDC                                                                    EIGM  35
      LEVEL 3, BECS,BBECS                                               EIGM  36
CCDC                                                                    EIGM  37
C                                                                       EIGM  38
      ITAPEW = ITAPES(6)                                                EIGM  39
      MTAP1 = ITAPES(37)                                                EIGM  40
      MTAP50 = ITAPES(50)                                               EIGM  41
      MTAP = MTAP50                                                     EIGM  42
      MID = 40                                                          EIGM  43
C                                                                       EIGM  44
CIBM                                                                    EIGM  45
C     ITAPWK=59                                                         EIGM  46
C     REWIND ITAPWK                                                     EIGM  47
C     WRITE (ITAPWK) B, BB                                              EIGM  48
C     REWIND ITAPWK                                                     EIGM  49
CIBM                                                                    EIGM  50
C                                                                       EIGM  51
CCDC                                                                    EIGM  52
      MIDSQ2 = MID * MID * 2                                            EIGM  53
      CALL WRITEC(B(1,1),BECS(1,1),M'DSQ2)                              EIGM  54
      CALL WRITEC(BB(1,1),BBECS(1,1),MIDSQ2)                            EIGM  55
CCDC                                                                    EIGM  56
C                                                                       EIGM  57
      NQ   = LC(2)                                                      EIGM  58
```

```
      IF (IE.EQ.1)  NQZ = NQ
      NROW = (NQ*NQ)/3
      NDZS = 50 - NROW
C
C     ******************************************************
C     *       THE FOLLOWING LINES OF CODE ARE NOT USED     *
C     *       IN THE CURRENT VERSION OF ESP BECAUSE 'BB'   *
C     *       IS TEMPORARILY SAVED ON AN I/O UNIT AND      *
C     *       'BB' AND 'CC' ARE EQUIVALENCED.              *
C     ******************************************************
C     DO 1  I=1,NQ
C     DO 1  J=1,NQ
C   1 CC(I,J) = BB(I,J)
C     ******************************************************
C     *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *
C     ******************************************************
C
      IF (IE.NE.1) CALL CONV (NQ,NQZ,NOMI,NIND,CC)
      NIX  =  0
      IF (LC(12).NE.0)  CALL SREVNC (CC,NQZ,LOC,MID,NIX)
      IF (NIX.EQ.0) GOTO 2
      WRITE (ITAPEW,3)
      STOP
    2 REWIND MTAP
C
C
      NVBO = LC(4)
C
      NLITE=0
      NVTOT = NVBO
      WRITE (MTAP1) VL,VH,FLO,FHI,IE,NQZ,NVTOT
    9 CONTINUE
      DO 21 IV=1,NVBO
      IF (LC(13) .EQ. 0)   GOTO 10
      READ (MTAP)  Q
      GOTO 30
   10 DO 40  I=1,NQ
   40 READ (MTAP)  (Q(I,II), II=1,NQ)
   30 CONTINUE
      IF ( LC(1) .NE. 2 )     GO TO 7
      XX        =  0.0
      XXX       =  RHO
      GO TO 8
    7 XX        =  RHO * VBO(IV) * BR
      XXX       =    XX * VBO(IV) * BR
    8 CONTINUE
      DO 20 I=1,NQ
      DO 20 J=1,NQ
      QAA(I,J)  =  RHO * Q(I,J)
     1           + CMPLX(REAL(DETAD(I,J))*XXX,AIMAG(DETAD(I,J))*XX)
      IF (LC(1).NE.2)  QAA(I,J) = QAA(I,J) + WW(I,J)
   20 CONTINUE
      IF (IE.EQ.1)  GOTO 6
      CALL CONV (NQ,NQZ,NOMI,NIND,QAA)
    6 NIX = 0
      IF (LC(12).EQ.0)  CALL SREVNC (QAA,NQZ,LOC,MID,NIX)
      IF (NIX.EQ.0) GOTO 4
```

```
      WRITE (ITAPEW,3)
      STOP
    4 DO 5  I=1,NQZ
      DO 5  J=1,NQZ
      SUM = 0.0
      IF (LC(12).EQ.0) AIB(I,J) = COMSCA(QAA(I,1),CC(1,J),SUM,
     1                                  NQZ,MID,1)
      IF (LC(12).NE.0) AIB(I,J) = COMSCA(CC(I,1),QAA(1,J), SUM,
     1                                  NQZ,MID,1)
    5 CONTINUE
      IF (LC(30).EQ.0) GOTO 25
      IF (LC(1).NE.2) GOTO 46
      IF (NLITE.EQ.0) WRITE (ITAPEW,800)
      WRITE (ITAPEW,801) RHOP
      GO TO 500
   46 IF(NLITE.EQ.0)WRITE (ITAPEW,802)
      WRITE (ITAPEW,609) VBO(IV), RHOP
  500 WRITE (ITAPEW,814)
      DO 12 I=1,NQZ
   12 WRITE (ITAPEW,608) (AIB(I,J),J=1,NQZ)
      NLITE = NLITE + NROW + 10
      IF(NLITE.GT.NDZS)NLITE=0
   25 CALL FLSL (RHOP, AIB, MID, IV)
   21 CONTINUE
C
CIBM
C     READ (ITAPWK) B, BB
C     REWIND ITAPWK
CIBM
C
CCDC
      CALL READEC(B(1,1),BECS(1,1),MIDSQ2)
      CALL READEC(BB(1,1),BBECS(1,1),MIDSQ2)
CCDC
C
      REWIND MTAP
C
C
C FORMATS
C
    3 FORMAT (1H1,20X, 33HFAILED TO INVERT STIFFNESS MATRIX, //,30X,
     1        20HEXECUTION TERMINATED)
  608 FORMAT(/( T8,1PE10.3,T20,1PE10.3, T6,2H (,T18,2H, ,T30,2H) ,
     1       T34,1PE10.3,T46,1PE10.3,T32,2H (,T44,2H, ,T56,2H) ,
     2         T60,1PE10.3,T72,1PE10.3,T58,2H (,T70,2H, ,T82,2H) ))
  609 FORMAT (/11X, 24HA-1B OR B-1A MATRIX-VBO=,F12.7,5X, 12HRHO/RHO(SL)
     1=, F12.7/)
  800 FORMAT (1H1,4X,19HDIVERGENCE ANALYSIS,//)
  801 FORMAT (//11X, 35HA-1B OR B-1A MATRIX - RHO/RHO(SL) =,F12.7//)
  802 FORMAT (1H1,4X, 16HFLUTTER ANALYSIS,//)
  814 FORMAT (/11X,  7HBY ROWS,15X,11H(REAL,IMAG),/)
C
      RETURN
      END
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3 EIGM               1        167

VARIABLES      SN  TYPE            RELOCATION
  565 AIB          COMPLEX     ARRAY               REFS       20       30      134      137   DEFINED      120      122
    0 B            COMPLEX     ARRAY    MODD       REFS       19       23       31       53      146
    0 BB           COMPLEX     ARRAY    FLEXT      REFS       19       22       32       54      147
 6200 BBECS        COMPLEX     ARRAY    BCOM       REFS       11       12       35       54      147
    0 BECS         COMPLEX     ARRAY    BCOM       REFS       11       12       35       53      146
    1 BETA         REAL                 FLUTAN     REFS       25
   50 BR           REAL                 COMA       REFS       28      101      102
    0 CC           COMPLEX     ARRAY    FLEXT      REFS       19       32       75       77      120      122
 6200 DETAD        COMPLEX     ARRAY    MODD       REFS       19       23    2*106
    3 FHI          REAL                 FLUTV      REFS       27       88
    2 FLO          REAL                 FLUTV      REFS       27       88
    0 FMACH        REAL                 FLUTAN     REFS       25
  560 I            INTEGER                         REFS       95    4*106    3*108    2*120    2*122      134
                                                DEFINED       94      104      117      133
    4 IE           INTEGER              FLUTV      REFS       27       58       75       88      110
  561 II           INTEGER                         REFS       95  DEFINED       95
    0 IR           INTEGER    *UNUSED    F.P.   DEFINED        1
    0 IS           INTEGER    *UNUSED    F.P.   DEFINED        1
    0 ITAPES       INTEGER     ARRAY    CTAPES     REFS       16       26       38       39       40
  543 ITAPEW       INTEGER                      DEFINED       38  I/O REFS       79      115      127      128      130
                                                    131      132      134
  557 IV           INTEGER                         REFS      101      102      131      137   DEFINED       90
  564 J            INTEGER                         REFS    4*106    3*108    2*120    2*122      134
                                                DEFINED      105      118      134
    0 LC           INTEGER     ARRAY    COMA       REFS       16       28       57       77       84       91       97
                                                    108      113      120      122      125      126
 6765 LOC          INTEGER     ARRAY               REFS       15       77      113
  547 MID          INTEGER                         REFS     2*52       77      113      120      122      137
                                                DEFINED       42
  550 MIDSQ2       INTEGER                         REFS       53       54      146      147   DEFINED       52
  546 MTAP         INTEGER                      DEFINED       41  I/O REFS       81       92       95      150
  544 MTAP1        INTEGER                      DEFINED       39  I/O REFS       88
  545 MTAP50       INTEGER                         REFS       41  DEFINED       40
17550 NC           INTEGER              MODD       REFS       23
  553 NDZS         INTEGER                         REFS      136  DEFINED       60
    1 NIND         INTEGER     ARRAY    FITR       REFS       15       24       75      111
  554 NIX          INTEGER                         REFS       77       78      113      114   DEFINED       76      112
  556 NLITE        INTEGER                         REFS      127      130      135      136   DEFINED       86      135
                                                    136
    0 NOMI         INTEGER              FITR       REFS       24       75      111
  551 NQ           INTEGER                         REFS       58     2*59       75       94       95      104      105
                                                    111  DEFINED       57
    5 NQZ          INTEGER              FLUTV      REFS       27       75       77       88      111      113      117
                                                    118      120      122      133      134   DEFINED       58
  552 NROW         INTEGER                         REFS       60      135  DEFINED       59
   57 NRVBO        INTEGER              FLUTAN     REFS       25
  555 NVBO         INTEGER                         REFS       87       90  DEFINED       84
    6 NVTOT        INTEGER              FLUTV      REFS       27       88  DEFINED       87
17500 OMG          REAL        ARRAY    MODD       REFS       15       23
 6200 OMGA         REAL        ARRAY    FLEXT      REFS       15       22
```

```
VARIABLES     SN  TYPE              RELOCATION
  565  Q          COMPLEX   ARRAY                  REFS      20      30     106   DEFINED     92      95
    0  QAA        COMPLEX   ARRAY    MODD          REFS      20      31     108     111      113     120     122
                                                 DEFINED    106     108
 6250  RHO        REAL               FLEXT         REFS      22      99     101     106
    0  RHOP       REAL                F.P.         REFS     128     131     137   DEFINED      1
   40  RVBO       REAL      ARRAY    FLUTAN        REFS      17      25
  541  SUM        COMPLEX                          REFS      10     120     122   DEFINED    119
 6251  VB         REAL               FLEXT         REFS      22
    2  VBO        REAL      ARRAY    FLUTAN        REFS      17      25     101     102      131
    1  VH         REAL               FLUTV         REFS      27      88
    0  VL         REAL               FLUTV         REFS      27      88
14400  WW         REAL      ARRAY    MODD          REFS      15      23     108
  562  XX         REAL                             REFS     102     106   DEFINED    98      101
  563  XXX        REAL                             REFS     106   DEFINED    99     102
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       COMSCA     COMPLEX    6               20      120     122
       CONV                  5               75      111
       FLSL                  4              137
       READEC                3              146      147
       SREVNC                5               77      113
       WRITEC                3               53       54

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       AIMAG      REAL       1  INTRIN              106
       CMPLX      COMPLEX    2  INTRIN              106
       REAL       REAL       1  INTRIN              106

STATEMENT LABELS              DEF LINE    REFERENCES
   45  2                          81         78
  451  3        FMT              155         79      115
  157  4                         117        114
    0  5                         124        117      118
  147  6                         112        110
  106  7                         101         97
  113  8                         103        100
    0  9            INACTIVE      89
   60  10                         94         91
    0  12                        134        133
    0  20                        109        104      105
    0  21                        138         90
  266  25                        137        125
  101  30                         96         93
    0  40                         95         94
  227  46                        130        126
  237  500                       132        129
  462  608      FMT              157        134
  502  609      FMT              160        131
  512  800      FMT              162        127
  517  801      FMT              163        128
  526  802      FMT              164        130
  532  814      FMT              165        132

LOOPS  LABEL     INDEX     FROM-TO     LENGTH    PROPERTIES
   54  21        IV         90 138      220B              EXT REFS  NOT INNER
   61  40        I          94 95        20B              EXT REFS  NOT INNER
```

```
LOOPS   LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   64             II          95  95        11B               EXT REFS
  114   20        I          104 109        30B               NOT INNER
  125   20        J          105 109        13B          OPT
  160   5         I          117 124        36B               EXT REFS  NOT INNER
  161   5         J          118 124        33B               EXT REFS
  242   12        I          133 134        20B               EXT REFS  NOT INNER
  245             J          134 134        11B               EXT REFS

COMMON BLOCKS     LENGTH      MEMBERS - BIAS NAME(LENGTH)
        BCOM        6400 ECS             0 BECS    (3200)          3200 BBECS   (3200)
        FLEXT       3242                 0 BB      (3200)          3200 OMGA    (40)           3240 RHO     (1)
                                      3241 VB      (1)
        MODD        8041                 0 B       (3200)          3200 DETAD   (3200)         6400 WW      (1600)
                                      8000 OMG     (40)            8040 NC      (1)
        FITR          41                 0 NOMI    (1)                1 NIND    (40)
        FLUTAN        48                 0 FMACH   (1)                1 BETA    (1)               2 VBO     (30)
                                        32 RVBO    (15)              47 NRVBO   (1)
        CTAPES        50                 0 ITAPES  (50)
        FLUTV          7                 0 VL      (1)                1 VH      (1)               2 FLO     (1)
                                         3 FHI     (1)                4 IE      (1)               5 NQZ     (1)
                                         6 NVTOT   (1)
        COMA          41                 0 LC      (40)              40 BR      (1)

EQUIV CLASSES     LENGTH      MEMBERS - BIAS NAME(LENGTH)
        Q           3200                 0 AIB     (3200)
BB      BB          3200                 0 CC      (3200)
B       B           3200                 0 QAA     (3200)

STATISTICS
  PROGRAM LENGTH                 7037B     3615
  CM LABELED COMMON LENGTH      26316B    11470
  ECS LABELED COMMON LENGTH     14400B     6400
        52000B CM USED
```

```
            SUBROUTINE CONV (NQ,NQZ,NOMI,NIND,A)                       CONV      2
      C                                                                CONV      3
      C                                                                CONV      4
      C     MODE ELIMINATION SCHEME FOR DETERMINANT                    CONV      5
      C                                                                CONV      6
            DIMENSION NIND(40)                                         CONV      7
      C                                                                CONV      8
            COMPLEX   A(40,40), B(40,40)                               CONV      9
      C                                                                CONV     10
            NQZ = NQ - NOMI                                            CONV     11
            DO 1 I=1,NQ                                                CONV     12
            DO 1 J=1,NQ                                                CONV     13
          1 B(I,J) = A(I,J)                                            CONV     14
            DO 2 I=1,NQ                                                CONV     15
            IND = 0                                                    CONV     16
            DO 2 J=1,NQ                                                CONV     17
            DO 3 K=1,NOMI                                              CONV     18
            IF (NIND(K).EQ.J) GO TO 4                                  CONV     19
          3 CONTINUE                                                   CONV     20
            GO TO 2                                                    CONV     21
          4 IND = IND + 1                                              CONV     22
            NRA = NQ - IND                                             CONV     23
            J1 = J - IND + 1                                           CONV     24
            DO 5 K = J1,NRA                                            CONV     25
          5 A(I,K) = B(I,K+IND)                                        CONV     26
          2 CONTINUE                                                   CONV     27
            DO 6 I=1,NQ                                                CONV     28
            DO 6 J=1,NQZ                                               CONV     29
          6 B(I,J) = A(I,J)                                            CONV     30
            DO 7 J=1,NQZ                                               CONV     31
            IND = 0                                                    CONV     32
            DO 7 I=1,NQ                                                CONV     33
            DO 8 K=1,NOMI                                              CONV     34
            IF (NIND(K) EQ.I) GO TO 9                                  CONV     35
          8 CONTINUE                                                   CONV     36
            GO TO 7                                                    CONV     37
          9 IND = IND + 1                                              CONV     38
            NRA = NQ - IND                                             CONV     39
            I1 = I -IND + 1                                            CONV     40
            DO 10 K = I1,NRA                                           CONV     41
         10 A(K,J) = B(K+IND,J)                                        CONV     42
          7 CONTINUE                                                   CONV     43
            RETURN                                                     CONV     44
            END                                                        CONV     45
```

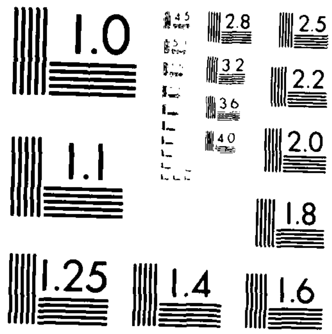
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 CONV	1	43

VARIABLES	SN	TYPE	RELOCATION									
0 A		COMPLEX	ARRAY	F.P.	REFS	8	13	29	DEFINED	1	25	41
160 B		COMPLEX	ARRAY		REFS	8	25	41	DEFINED	13	29	

AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2 4/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
VARIABLES     SN  TYPE          RELOCATION
  151  I          INTEGER                          REFS      2*13     2*25     2*29       34       39
                                                DEFINED        11       14       27       32
  153  IND        INTEGER                          REFS        21       22       23       25       37       38       39
                                                     41   DEFINED       15       21       31       37
  157  I1         INTEGER                          REFS        40  DEFINED       39
  152  J          INTEGER                          REFS      2*13       18       23     2*29     2*41
                                                DEFINED        12       16       28       30
  156  J1         INTEGER                          REFS        24  DEFINED       23
  154  K          INTEGER                          REFS        18     2*25       34     2*41  DEFINED       17       24
                                                     33        40
    0  NIND       INTEGER    ARRAY     F.P.        REFS         6       18       34  DEFINED        1
    0  NOMI       INTEGER              F.P.        REFS        10       17       33  DEFINED        1
    0  NQ         INTEGER              F.P.        REFS        10       11       12       14       16       22       27
                                                     32        38  DEFINED        1
    0  NQZ        INTEGER              F.P.        REFS        28       30  DEFINED        1       10
  155  NRA        INTEGER                          REFS        24       40  DEFINED       22       38

STATEMENT LABELS              DEF LINE   REFERENCES
    0  1                          13          11       12
   64  2                          26          14       16       20
    0  3                          19          17
   43  4                          21          18
    0  5                          25          24
    0  6                          29          27       28
  143  7                          42          30       32       36
    0  8                          35          33
  123  9                          37          34
    0  10                         41          40

LOOPS  LABEL      INDEX     FROM-TO     LENGTH    PROPERTIES
   12  1          I          11 13        17B               NOT INNER
   22  1          J          12 13         3B      INSTACK
   32  2          I          14 26        37B               NOT INNER
   34  2          J          16 26        33B               NOT INNER
   35  3          K          17 19         5B      INSTACK     EXITS
   60  5          K          24 25         3B      INSTACK
   72  6          I          27 29        17B               NOT INNER
  102  6          J          28 29         3B      INSTACK
  112  7          J          30 42        36B               NOT INNER
  114  7          I          32 42        32B               NOT INNER
  115  8          K          33 35         5B      INSTACK     EXITS
  137  10         K          40 41         3B      INSTACK

STATISTICS
  PROGRAM LENGTH               6405B     3333
          52000B CM USED
```

```
      SUBROUTINE SREVNC(A,M,LOC,MID,NIX)                                SREVNC   2
      DIMENSION  A(2,1), LOC(1)                                         SREVNC   3
C                                                                       SREVNC   4
C   FIRST SUBSCRIPT MERELY SELECTS REAL OR IMAG. PART.  TO CALLING      SREVNC   5
C   PROGRAM, ROUTINE APPEARS TO BE INVERTING A COMPLEX M BY M MATRIX    SREVNC   6
C   STORED IN A COMPLEX ARRAY OF DIMENSION (MID,*).                     SREVNC   7
C                                                                       SREVNC   8
      KK = 1                                                            SREVNC   9
      KB = 1                                                            SREVNC  10
      MK = M                                                            SREVNC  11
      MID1 = MID + 1                                                    SREVNC  12
      MM = M*MID1 - MID                                                 SREVNC  13
      DO 190  K = 1,M                                                   SREVNC  14
      BIG = 0.                                                          SREVNC  15
      DO 110  IK = KK,MK                                                SREVNC  16
      X = A(1,IK)**2 + A(2,IK)**2                                       SREVNC  17
      IF (X - BIG) 110,100,100                                          SREVNC  18
  100 L = IK                                                            SREVNC  19
      BIG = X                                                           SREVNC  20
   10 CONTINUE                                                          SREVNC  21
      L = L - KB + 1                                                    SREVNC  22
      IF (BIG) 130,120,130                                              SREVNC  23
  120 NIX = -K                                                          SREVNC  24
      RETURN                                                            SREVNC  25
  130 LOC(K)  = L                                                       SREVNC  26
      IF (L - K) 135,145,135                                            SREVNC  27
  135 LJ = L                                                            SREVNC  28
      DO 140  KJ = K,MM,MID                                             SREVNC  29
      X = A(1,KJ)                                                       SREVNC  30
      Y = A(2,KJ)                                                       SREVNC  31
      A(1,KJ) = A(1,LJ)                                                 SREVNC  32
      A(2,KJ) = A(2,LJ)                                                 SREVNC  33
      A(1,LJ) = X                                                       SREVNC  34
      A(2,LJ) = Y                                                       SREVNC  35
  140 LJ = LJ + MID                                                     SREVNC  36
  145 X = A(1,KK)                                                       SREVNC  37
      A(1,KK) = 1.                                                      SREVNC  38
      Y = A(2,KK)                                                       SREVNC  39
      A(2,KK) = 0.                                                      SREVNC  40
      T = X*X + Y*Y                                                     SREVNC  41
      X = X / T                                                         SREVNC  42
      Y = Y / T                                                         SREVNC  43
      DO 150  KJ = K,MM,MID                                             SREVNC  44
      T = A(1,KJ)*X + A(2,KJ)*Y                                         SREVNC  45
      A(2,KJ) = A(2,KJ)*X - A(1,KJ)*Y                                   SREVNC  46
  150 A(1,KJ) = T                                                       SREVNC  47
      IK = KB                                                           SREVNC  48
      DO 180  I = 1,M                                                   SREVNC  49
      IF (I - K) 160,180,160                                            SREVNC  50
  160 X = -A(1,IK)                                                      SREVNC  51
      A(1,IK) = 0.                                                      SREVNC  52
      Y = -A(2,IK)                                                      SREVNC  53
      A(2,IK) = 0.                                                      SREVNC  54
      KJ = K                                                            SREVNC  55
      DO 170  IJ = I,MM,MID                                             SREVNC  56
      A(1,IJ) = A(1,IJ) + A(1,KJ)*X - A(2,KJ)*Y                         SREVNC  57
      A(2,IJ) = A(2,IJ) + A(1,KJ)*Y + A(2,KJ)*X                         SREVNC  58
```

```
      170 KJ = KJ + MID                                      SREVNC   59
      180 IK = IK + 1                                        SREVNC   60
          KB = KB + MID                                      SREVNC   61
          MK = MK + MID                                      SREVNC   62
          KK = KK + MID1                                     SREVNC   63
      190 CONTINUE                                           SREVNC   64
          K = M                                              SREVNC   65
      200 MK = MK - MID                                      SREVNC   66
          KB = KB - MID                                      SREVNC   67
          L = LOC(K)                                         SREVNC   68
          IF (L - K) 205,215,205                             SREVNC   69
      205 IL = (L - 1) * MID                                 SREVNC   70
          DO 210  IK = KB,MK                                 SREVNC   71
          IL = IL + 1                                        SREVNC   72
          X = A(1,IK)                                        SREVNC   73
          Y = A(2,IK)                                        SREVNC   74
          A(1,IK) = A(1,IL)                                  SREVNC   75
          A(2,IK) = A(2,IL)                                  SREVNC   76
          A(1,IL) = X                                        SREVNC   77
      210 A(2,IL) = Y                                        SREVNC   78
      215 K = K - 1                                          SREVNC   79
          IF (K) 220,220,200                                 SREVNC   80
      220 NIX = 0                                            SREVNC   81
          RETURN                                             SREVNC   82
          END                                                SREVNC   83
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  SREVNC          1          24         81

VARIABLES      SN  TYPE           RELOCATION
   0  A             REAL        ARRAY     F.P.     REFS        2     2*16      29       30       31       32       36
                                                     38     2*44     2*45      50       52     3*56     3*57       72
                                                     73       74       75   DEFINED      1       31       32       33
                                                     34       37       39      45       46       51       53       56
                                                     57       74       75      76       77
 213  BIG           REAL                           REFS       17       22   DEFINED     14       19
 223  I             INTEGER                        REFS       49       55   DEFINED     48
 224  IJ            INTEGER                        REFS     2*56     2*57   DEFINED     55
 214  IK            INTEGER                        REFS     2*16       18      50       51       52       53       59
                                                     72       73       74      75   DEFINED      5       47       59
                                                     70
 225  IL            INTEGER                        REFS       71       74      75       76       77
                                                DEFINED       69       71
 212  K             INTEGER                        REFS       23       25      26       28       43       49       54
                                                     67       68       78      79   DEFINED     13       64       78
 206  KB            INTEGER                        REFS       21       47      60       66       70
                                                DEFINED        9       60      66
 220  KJ            INTEGER                        REFS       29       30      31       32     2*44     3*45       46
                                                   2*56     2*57       58   DEFINED     28       43       54       58
 205  KK            INTEGER                        REFS       15       36      37       38       39       62
                                                DEFINED        8       62
```

```
VARIABLES       SN  TYPE           RELOCATION
  216  L            INTEGER                            REFS        21       25       26       27       68       69
                                                    DEFINED        18       21       67
  217  LJ           INTEGER                            REFS        31       32       33       34       35
                                                    DEFINED        27       35
    0  LOC          INTEGER      ARRAY       F.P.      REFS         2       67  DEFINED        1       25
    0  M            INTEGER                  F.P.      REFS        10       12       13       48       64
                                                    DEFINED         1
    0  MID          INTEGER                  F.P.      REFS        11       12       28       35       43       55       58
                                                         60        61       65       66       69  DEFINED        1
  210  MID1         INTEGER                            REFS        12       62  DEFINED       11
  207  MK           INTEGER                            REFS        15       61       65       70  DEFINED       10       61
                                                         65
  211  MM           INTEGER                            REFS        28       43       55  DEFINED       12
    0  NIX          INTEGER                  F.P.   DEFINED         1       23       80
  222  T            REAL                               REFS        41       42       46  DEFINED       40       44
  215  X            REAL                               REFS        17       19       33     2*40       41       44       45
                                                         56        57       76  DEFINED       16       29       36       41
                                                         50        72
  221  Y            REAL                               REFS        34     2*40       42       44       45       56       57
                                                         77   DEFINED       30       38       42       52       73

STATEMENT LABELS                DEF LINE   REFERENCES
    0  100          INACTIVE       18        2*17
   26  110                         20          15        17
    0  120          INACTIVE       23          22
   36  130                         25        2*22
    0  135          INACTIVE       27        2*26
    0  140                         35          28
   60  145                         36          26
    0  150                         46          43
    0  160          INACTIVE       50        2*49
    0  170                         58          55
  134  180                         59          48        49
    0  190                         63          13
  152  200                         65          79
    0  205          INACTIVE       69        2*68
    0  210                         77          70
  200  215                         78          68
    0  220          INACTIVE       80        2*79

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   14  190      K          13 63      134B               NOT INNER
   21  110      IK         15 20        7B      INSTACK
   50  140      KJ         28 35        7B      INSTACK
   74  150      KJ         43 46        6B      INSTACK
  105  180      I          48 59       33B               NOT INNER
  122  170      IJ         55 58       11B        OPT
  170  210      IK         70 77        7B      INSTACK

STATISTICS
  PROGRAM LENGTH                 247B      167
          52000B CM USED
```

```
      SUBROUTINE FLSL (RHOP, Q, MMOD, IV)                               FLSL   2
C                                                                       FLSL   3
C     FLUTTER SOLUTION DECK USING QR ALGORITHM FOR EIGENVALUE           FLSL   4
C     DETERMINATION PROVIDING GERSCHGORIN DISC TEST FOR ROOT            FLSL   5
C     CHECK AND INCLUDING PRINT PLOT FOR FLUTTER SOLUTION               FLSL   6
C                                                                       FLSL   7
      DIMENSION OMG(40), FREQ(40), GC(40), FLSP(40), DAMP(40)           FLSL   8
      DIMENSION GR(40), CFREQ(40), VFLSP(40), XI(40), XR(40)            FLSL   9
      DIMENSION VALUE(41), AR(41)                                       FLSL  10
      DIMENSION QQZ(220), ZR(220), ZI(220)                              FLSL  11
      DIMENSION WW(40,40), BMG(40), NIND(40)                            FLSL  12
      DIMENSION          LC(40)                                         FLSL  13
      DIMENSION VBO(30), RVBO(15)                                       FLSL  14
      DIMENSION ITAPES(50)                                              FLSL  15
C                                                                       FLSL  16
      COMPLEX B(40,40), DETAD(40,40), BB(40,40), Q(MMOD,1)              FLSL  17
      COMPLEX ROOT(40), VEC(40,40), RQ(40,40), VINFV(40,40)             FLSL  18
      COMPLEX RORT(40), ROBT(40), VECT(40,40)                           FLSL  19
      COMPLEX A(1600)                                                   FLSL  20
C                                                                       FLSL  21
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                 FLSL  22
      COMMON /FITR  / NOMI, NIND                                        FLSL  23
      COMMON /FLEXT / BB, OMG, RHO, VB                                  FLSL  24
      COMMON /FLUTV / VL, VH, FLO, FHI, IE, NQZ, NVTOT                  FLSL  25
      COMMON /MODD  / B, DETAD, WW, BMG, NC                             FLSL  26
      COMMON /COMA  / LC, BR                                            FLSL  27
      COMMON / CTAPES / ITAPES                                          FLSL  28
C                                                                       FLSL  29
      EQUIVALENCE (B(1,1),RQ(1,1),VECT(1,1))                            FLSL  30
      EQUIVALENCE (A(1),VINFV(1,1))                                     FLSL  31
C                                                                       FLSL  32
      ITAPEW = ITAPES(6)                                                FLSL  33
      MTAP2  =  ITAPES(22)                                              FLSL  34
      MTAP1  =  ITAPES(37)                                              FLSL  35
      MTAP49 =  ITAPES(49)                                              FLSL  36
C                                                                       FLSL  37
      NQ = NQZ                                                          FLSL  38
      JSS = 0                                                           FLSL  39
      IF (LC(1).EQ.2) JSS = 1                                           FLSL  40
      TOLR = 1.0E-05                                                    FLSL  41
C                                                                       FLSL  42
      NPOINT  =  NC                                                     FLSL  43
      NREFO = LC(11)                                                    FLSL  44
      NLITE1= 0                                                         FLSL  45
      DO 348 I=1,NQ                                                     FLSL  46
      DO 348 J=1,NQ                                                     FLSL  47
  348 RQ(I,J)=Q(I,J)                                                    FLSL  48
      IF (LC(20).NE.0) MQ = -NQ                                         FLSL  49
      IF (LC(20).EQ.0) MQ =  NQ                                         FLSL  50
      CALL BUCK (Q,MQ,ROOT,NQ,AR,MMOD,VEC,1,A,1.0E-07,NIX)              FLSL  51
      IF(NIX.LE.0)GO TO 213                                             FLSL  52
      NRTS=NQ-NIX                                                       FLSL  53
      WRITE (ITAPEW,214)NIX                                             FLSL  54
      WRITE (ITAPEW,215)(ROOT(I),I=1,NRTS)                              FLSL  55
      GO TO 347                                                         FLSL  56
  213 CALL GGCHK (NQ,RQ,VEC,ROOT,QUO,VINFV,GR,GC,ICLUE,NOD,Q,TOLR,MMOD) FLSL  57
      DO 2 IB =1,NQ                                                     FLSL  58
```

```
    2 RORT(IB) = ROOT(IB)                                                   FLSL
      CALL TRFR(RORT,ITCH3,JSS,FREQ,FLSP,DAMP,CFREQ,VFLSP,NQ,BR,ROBT,       FLSL
     1          OMG(NREFO),RHOP,VBO(IV),VECT,VEC)                           FLSL
      IF(JSS.NE.O)GO TO 4                                                   FLSL
      IF (LC(15).EQ.O) WRITE(MTAP2) (CFREQ(I),DAMP(I),VFLSP(I),I=1,NQ)      FLSL
      IF (LC(15).NE.O) WRITE(MTAP2) (CFREQ(I),DAMP(I), FLSP(I),I=1,NQ)      FLSL
      IF (LC(14).EQ.O) GOTO 4                                               FLSL
      IF(LC(15).EQ.O) WRITE(MTAP1)(CFREQ(I),DAMP(I),VFLSP(I),I=1,NQ)        FLSL
      IF(LC(15).NE.O) WRITE(MTAP1)(CFREQ(I),DAMP(I),FLSP(I) ,I=1,NQ)        FLSL
    4 IF (JSS.EQ.O) GO TO 9                                                 FLSL
      IF(NLITE1.EQ.O)WRITE (ITAPEW,1139)                                    FLSL
      LILG=48-2*NQ                                                          FLSL
      LADD=12+2*NQ                                                          FLSL
      IF (ICLUE.EQ.O.AND.NLITE1.LE.LILG)  NLITE1 = NLITE1 + LADD            FLSL
      IF(NLITE1.GT.LILG)NLITE1=O                                            FLSL
      WRITE (ITAPEW,804)  FMACH, RHOP                                       FLSL
      WRITE (ITAPEW,805)  (ROBT(J),FREQ(J),FLSP(J),VFLSP(J),J=1,NQ)         FLSL
      IF(NOD.NE.O)WRITE (ITAPEW,221)                                        FLSL
      IF(QUO.GT.O.OO1)WRITE (ITAPEW,222)                                    FLSL
      IF(ICLUE.EQ.O)WRITE (ITAPEW,223)                                      FLSL
      IF(ICLUE.EQ.O)GO TO 12                                                FLSL
      WRITE (ITAPEW,224)                                                    FLSL
      WRITE (ITAPEW,225) (ROOT(I),VINFV(I,I),GR(I),GC(I),I=1,NQ)            FLSL
      GO TO 12                                                              FLSL
    9 IF(ICLUE.NE.O)NLITE1=O                                                FLSL
      IF(NLITE1.EQ.O)WRITE (ITAPEW,1138)                                    FLSL
      LILG=48-2*NQ                                                          FLSL
      LADD=12+2*NQ                                                          FLSL
      IF(ICLUE.EQ.O.AND.NLITE1.LE.LILG)NLITE1=NLITE1+LADD                   FLSL
      IF(NLITE1.GT.LILG)NLITE1=O                                            FLSL
      WRITE (ITAPEW,307) FMACH,RHOP,VBO(IV),(CFREQ(J),VFLSP(J),DAMP(J),     FLSL
     1FREQ(J),FLSP(J),J=1,NQ)                                               FLSL
      IF(NOD.NE.O)WRITE (ITAPEW,221)                                        FLSL
      IF(QUO.GT.O.OO1)WRITE (ITAPEW,222)                                    FLSL
      IF(ICLUE.EQ.O)WRITE (ITAPEW,223)                                      FLSL
      IF (ICLUE.EQ.O) GO TO 12                                              FLSL
      WRITE (ITAPEW,224)                                                    FLSL
      WRITE (ITAPEW,225) (ROOT(I),VINFV(I,I),GR(I),GC(I),I=1,NQ)            FLSL
      NLITE1=O                                                              FLSL
C     CALCULATE MODE SHAPES IN A PARTICULAR FREQUENCY BAND FOR              FLSL
C     SELECTED V/BO VALUES - M. CHERNOFF 1968                               FLSL
   12 IF ( LC(28) .EQ. O )     GO TO 347                                    FLSL
      IF (LC(1) .EQ. 2) GO TO 1                                             FLSL
      IF ( VBO(IV) .LT. VL .OR. VBO(IV) .GT. VH )      GO TO 347            FLSL
C      ********   CALCULATION OF EIGENVECTORS  ***********************      FLSL
    1 CONTINUE                                                              FLSL
      NQM1  =    NQ -   1                                                   FLSL
      LIN = O                                                               FLSL
      IF (JSS .NE. O)          WRITE (ITAPEW,11)                            FLSL
      IF (JSS .EQ. O)          WRITE (ITAPEW,100)  VBO(IV)                  FLSL
      DO 470     K = 1, NQ                                                  FLSL
      IF (LC(1) .EQ. 2)  GO TO 10                                           FLSL
      IF (CFREQ(K).LT.FLO.OR.CFREQ(K).GT.FHI) GOTO 470                      FLSL
   10 DO 230  I = 1,NQ                                                      FLSL
      XR(I) =  REAL (VECT(I,K))                                             FLSL
      XI(I) = AIMAG (VECT(I,K))                                             FLSL
  230 CONTINUE                                                              FLSL
```

```
          VALMAX        = 0.0                                             FLSL  116
          DO 460      I = 1, NQ                                           FLSL  117
          VALUE(1)= SQRT(XR(I)**2 + XI(I)**2)                             FLSL  118
          IF (VALUE(1)- VALMAX) 460, 460, 455                             FLSL  119
      455 VALMAX = VALUE(1)                                               FLSL  120
          MAX           = I                                               FLSL  121
      460 CONTINUE                                                        FLSL  122
          XRR           = XR(MAX)                                         FLSL  123
          XRI           = XI(MAX)                                         FLSL  124
          DENOM=XRR*XRR+XRI*XRI                                           FLSL  125
          DO 465      I = 1, NQ                                           FLSL  126
          VALUE(MMOD+1) = (XR(I) *XRR + XI(I) *XRI) /DENOM                FLSL  127
          XI(I)         = (XI(I) *XRR - XR(I) *XRI) /DENOM                FLSL  128
          XR(I)          = VALUE(MMOD+1)                                  FLSL  129
          VALUE(I) = SQRT(XR(I)**2 + XI(I)**2)                            FLSL  130
      465 CONTINUE                                                        FLSL  131
          LIN  =  LIN + 8 + NQ                                            FLSL  132
          IF (LIN.GT.45) LIN = 0                                          FLSL  133
          IF ( LIN .NE. 0 )          GO TO 14                             FLSL  134
          IF (JSS.NE. 0)     WRITE (ITAPEW,11)                            FLSL  135
          IF (JSS.NE. 0)     WRITE (ITAPEW,100)  VBO(IV)                  FLSL  136
       14 IF (JSS .NE. 0)    WRITE (ITAPEW,13)  K                         FLSL  137
          IF (JSS .EQ. 0)    WRITE (ITAPEW,6)   K , CFREQ(K)              FLSL  138
          WRITE (ITAPEW,611)(XR(I), XI(I), VALUE(I), I = 1, NQ)           FLSL  139
C                                                                         FLSL  140
          IF (LC(29).EQ.0) GOTO 470                                       FLSL  141
          DO 456  I=1,NPOINT                                              FLSL  142
          ZR(I) = 0.0                                                     FLSL  143
      456 ZI(I) = 0.0                                                     FLSL  144
          LC2 = LC(2)                                                     FLSL  145
          II = 1                                                          FLSL  146
          REWIND MTAP49                                                   FLSL  147
          DO 466 J = 1,LC2                                                FLSL  148
          CALL RNRW (-MTAP49,QQZ,NPOINT)                                  FLSL  149
          IF (IE.EQ.1) GOTO 469                                           FLSL  150
          DO 467 JJ = 1,NOMI                                              FLSL  151
          IF (J.EQ.NIND(JJ)) GOTO 466                                     FLSL  152
      467 CONTINUE                                                        FLSL  153
      469 DO 468 I = 1,NPOINT                                             FLSL  154
          ZR(I) = ZR(I) + QQZ(I)*XR(II)                                   FLSL  155
      468 ZI(I) = ZI(I) + QQZ(I)*XI(II)                                   FLSL  156
          II = II + 1                                                     FLSL  157
      466 CONTINUE                                                        FLSL  158
          REWIND MTAP49                                                   FLSL  159
          LIN  =  LIN + 8 + LC2                                           FLSL  160
          IF (LIN.GT.45) LIN = 0                                          FLSL  161
          IF (LIN.EQ.0) WRITE (ITAPEW,100) VBO(IV)                        FLSL  162
          WRITE (ITAPEW,609) ((ZR(I),ZI(I)),I = 1,NPOINT)                 FLSL  163
      470 CONTINUE                                                        FLSL  164
      347 CONTINUE                                                        FLSL  165
C                                                                         FLSL  166
C                                                                         FLSL  167
C                                                                         FLSL  168
C FORMATS                                                                 FLSL  169
C                                                                         FLSL  170
        6 FORMAT (//15X,10HMODE NO. =,I3,10X,18HFREQUENCY IN CPS =,F10.3,/) FLSL  171
       11 FORMAT (1H1/15X,32HDIVERGENCE ANALYSIS EIGENVECTORS//)          FLSL  172
```

```
      13 FORMAT (//15X,11HMODE NO. = ,I3/)                                FLSL  173
     100 FORMAT (1H1,/15X,26HFLUTTER VECTORS FOR VBO = ,F11.4//)          FLSL  174
     214 FORMAT (1H1, 4X, 27HSOLUTION FAILED TO PRODUCE ,I5,2X,5HROOTS, // FLSL  175
        1         5X, 29HROOTS OBTAINED ARE AS FOLLOWS, //)               FLSL  176
     215 FORMAT(2H (,1PE12.4,2H, ,E12.4,2H) )                             FLSL  177
     221 FORMAT (//5X, 62HTHE PRINCIPAL VECTORS DO NOT FORM A LINEARLY INDE FLSL  178
        1PENDENT ARRAY, /5X, 23HMATRIX IS NEAR SINGULAR,/)                FLSL  179
     222 FORMAT (/5X, 54HTHE SIMILARITY TRANSFORMATION TO DIAGONAL FORM IS FLSL  180
        1POOR,/)                                                          FLSL  181
     223 FORMAT (//5X, 30HALL ROOTS CHECK AND ARE UNIQUE,/)               FLSL  182
     224 FORMAT (/10X, 61HGERSCHGORIN CIRCLE RADII REPRESENT MAX. ERROR DUE FLSL  183
        1 TO NUMERICS,/5X, 20HCOMPUTED EIGENVALUES, 5X, 26HGERSCHGORIN CIRC FLSL  184
        2LE CENTERS,12X, 24HGERSCHGORIN CIRCLE RADII,/, 72X,              FLSL  185
        3 7HROW SUM, 5X, 7HCOL SUM,/)                                     FLSL  186
     225 FORMAT (2(2H (,1PE12.4,2H, ,E12.4,2H) ),9X,E12.4,3X,E12.4)       FLSL  187
     307 FORMAT (//5X9HMACH NO =,F6.3,5X13HRHO/RHO(SL) =F11.4,5X,         FLSL  188
        1         5HVBO =,F11.4,//3X, 6HC.P.S.,5X, 8HV,EQUIV., 3X,        FLSL  189
        2         7HDAMPING,5X, 7HRAD/SEC,3X, 5HVTRUE,/(1HO,F11.4,F11.4,  FLSL  190
        3         F11.6,F11.4,F11.4))                                     FLSL  191
     609 FORMAT (// 30H  PHYSICAL FLUTTER MODE SHPAES, /                  FLSL  192
        1         36H      REAL                  IMAGINARY,/              FLSL  193
        2         (9X,E15.4,5X,E15.4))                                    FLSL  194
     611 FORMAT (//5X,4HREAL,11X,9HIMAGINARY,9X,7HMODULUS,//              FLSL  195
        1         (1PE14.5,2E17.5))                                       FLSL  196
     804 FORMAT (/32X,10HMACH NO = ,F6.3,10X, 14HRHO/RHO(SL) = ,F6.3//    FLSL  197
        1          28X, 5HROOTS,41X, 10HVELOCITIES, //                    FLSL  198
        2          19X, 18H( REAL   ,    IMAG ),17X,6HFT/SEC,12X,         FLSL  199
        3          11HKNOTS(TRUE), 9X, 9HKNOTS(EQ), //)                   FLSL  200
     805 FORMAT (/(10X,2H (,E15.7,2H, ,E15.7,2H) ,3(5X,E15.7)))           FLSL  201
    1138 FORMAT( 1H1,28X,17HFLUTTER SOLUTIONS )                           FLSL  202
    1139 FORMAT (1H1,41X, 19HDIVERGENCE ANALYSIS,//)                      FLSL  203
C                                                                         FLSL  204
         RETURN                                                           FLSL  205
         END                                                              FLSL  206
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  FLSL          1          204

VARIABLES      SN  TYPE          RELOCATION
  1503  A          COMPLEX   ARRAY             REFS      19     30     50
 10524  AR         REAL      ARRAY             REFS       9     50
     0  B          COMPLEX   ARRAY    MODD     REFS      16     25     29
     0  BB         COMPLEX   ARRAY    FLEXT    REFS      16     23
     1  BETA       REAL               FLUTAN   REFS      21
 17500  BMG        REAL      ARRAY    MODD     REFS      11     25
    50  BR         REAL               COMA     REFS      26     59
 10213  CFREQ      REAL      ARRAY             REFS       8     59     62     63     65     66     88
                                               2*110    137
 10073  DAMP       REAL      ARRAY             REFS       7     59     62     63     65     66     88
  1477  DENOM      REAL                        REFS     126    127  DEFINED  124
  6200  DETAD      COMPLEX   ARRAY    MODD     REFS      16     25
```

```
VARIABLES       SN  TYPE           RELOCATION
     3  FHT         REAL                FLUTV      REFS          24         110
     2  FLO         REAL                FLUTV      REFS          24         110
 10023  FLSP        REAL        ARRAY              REFS           7          59          63          66          74          88
     0  FMACH       REAL                FLUTAN     REFS          21          73          88
  7703  FREQ        REAL        ARRAY              REFS           7          59          74          88
  7753  GC          REAL        ARRAY              REFS           7          56          80          95
 10143  GR          REAL        ARRAY              REFS           8          56          80          95
  1454  I           INTEGER                        REFS        2*47          54        3*62        3*63        3*65        3*66        5*80
                                                   5*95       2*112       2*113       2*117         120       2*126       3*127         128
                                                  3*129       3*138         142         143       3*154       3*155       2*162
                                                DEFINED          45          54          62          63          65          66          80
                                                     95         111         116         125         138         141         153         162
  1464  IB          INTEGER                        REFS        2*58     DEFINED          57
  1462  ICLUE       INTEGER                        REFS          56          71          77          78          82          86          92
                                                     93
     4  IE          INTEGER             FLUTV      REFS          24         149
  1501  II          INTEGER                        REFS         154         155         156     DEFINED         145         156
     0  ITAPES      INTEGER     ARRAY   CTAPES     REFS          14          27          32          33          34          35
  1442  ITAPEW      INTEGER                     DEFINED          32    I/O REFS          53          54          68          73          74
                                                     75          76          77          79          80          83          88          90
                                                     91          92          94          95         106         107         134         135
                                                    136         137         138         161         162
  1465  ITCH3     * INTEGER                        REFS          59
     0  IV          INTEGER              F.P.      REFS          59          88       2*101         107         135         161
                                                DEFINED           1
  1455  J           INTEGER                        REFS        2*47        4*74        5*88         151     DEFINED          46          74
                                                     88         147
  1502  JJ          INTEGER                        REFS         151     DEFINED         150
  1447  JSS         INTEGER                        REFS          59          61          67         106         107         134         135
                                                    136         137     DEFINED          38          39
  1472  K           INTEGER                        REFS       2*110         112         113         136       2*137
                                                DEFINED         108
  1467  LADD        INTEGER                        REFS          71          86     DEFINED          70          85
     0  LC          INTEGER     ARRAY   COMA       REFS          12          26          39          43          48          49          62
                                                     63          64          65          66          99         100         109         140
                                                    144
  1500  LC2         INTEGER                        REFS         147         159     DEFINED         144
  1466  LILG        INTEGER                        REFS          71          72          86          87     DEFINED          69          84
  1471  LIN         INTEGER                        REFS         131         132         133         159         160         161
                                                DEFINED         105         131         132         159         160
  1474  MAX         INTEGER                        REFS         122         123     DEFINED         120
     0  MMOD        INTEGER              F.P.      REFS          16          50          56         126         128
                                                DEFINED           1
  1456  MQ          INTEGER                        REFS          50     DEFINED          48          49
  1444  MTAP1       INTEGER                     DEFINED          34    I/O REFS          65          66
  1443  MTAP2       INTEGER                     DEFINED          33    I/O REFS          62          63
  1445  MTAP49      INTEGER                        REFS         148     DEFINED          35    I/O REFS         146         158
 17550  NC          INTEGER             MODD       REFS          25          42
     1  NIND        INTEGER     ARRAY   FITR       REFS          11          22         151
  1457  NIX         INTEGER                        REFS          50          51          52          53
  1453  NLITE1      INTEGER                        REFS          68        2*71          72          83        2*86          87
                                                DEFINED          44          71          72          82          86          87          96
  1463  NOD         INTEGER                        REFS          56          75          90
     0  NOMI        INTEGER             FITR       REFS          22         150
  1451  NPOINT      INTEGER                        REFS         141         148         153         162     DEFINED          42
  1446  NQ          INTEGER                        REFS          45          46          48          49          50          52          56
                                                     57          59          62          63          65          66          69          70
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VARIABLES      SN  TYPE            RELOCATION
                                                       74       80       84       85       88       95      104      108
                                                      111      116      125      131      138  DEFINED       37
 1470  NQM1    * INTEGER                           DEFINED      104
    5  NQZ       INTEGER                FLUTV         REFS       24       37
 1452  NREFO     INTEGER                              REFS       59  DEFINED       43
 1460  NRTS      INTEGER                              REFS       54  DEFINED       52
   57  NRVBO     INTEGER                FLUTAN        REFS       21
    6  NVTOT     INTEGER                FLUTV         REFS       24
 6200  OMG       REAL          ARRAY    FLEXT         REFS        7       23       59
    0  Q         COMPLEX       ARRAY     F.P.         REFS       16       47       50       56  DEFINED        1
10575  QQZ       REAL          ARRAY                  REFS       10      148      154      155
 1461  QUO       REAL                                 REFS       56       76       91
 6250  RHO       REAL                   FLEXT         REFS       23
    0  RHOP      REAL                    F.P.         REFS       59       73       88  DEFINED        1
20461  ROBT      COMPLEX       ARRAY                  REFS       18       59       74
12021  ROOT      COMPLEX       ARRAY                  REFS       17       50       54       56       58       80       95
20341  RORT      COMPLEX       ARRAY                  REFS       18       59  DEFINED       58
    0  RQ        COMPLEX       ARRAY    MODD          REFS       17       29       56  DEFINED       47
   40  RVBO      REAL          ARRAY    FLUTAN        REFS       13       21
 1450  TOLR      REAL                                 REFS       56  DEFINED       40
 1473  VALMAX    REAL                                 REFS      118  DEFINED      115      119
10453  VALUE     REAL          ARRAY                  REFS        9      118      119      128      138
                                                   DEFINED      117      126      129
 6251  VB        REAL                   FLEXT         REFS       23
    2  VBO       REAL          ARRAY    FLUTAN        REFS       13       21       59       88    2*101      107      135
                                                      161
12141  VEC       COMPLEX       ARRAY                  REFS       17       50       56       59
    0  VECT      COMPLEX       ARRAY    MODD          REFS       18       29       59      112      113
10263  VFLSP     REAL          ARRAY                  REFS        8       59       62       65       74       88
    1  VH        REAL                   FLUTV         REFS       24      101
 1503  VINFV     COMPLEX       ARRAY                  REFS       17       30       56       80       95
    0  VL        REAL                   FLUTV         REFS       24      101
14400  WW        REAL          ARRAY    MODD          REFS       11       25
10333  XI        REAL          ARRAY                  REFS        8      117      123      126      127      129      138
                                                      155  DEFINED      113      127
10403  XR        REAL          ARRAY                  REFS        8      117      122      126      127      129      138
                                                      154  DEFINED      112      128
 1476  XRI       REAL                                 REFS    2*124      126      127  DEFINED      123
 1475  XRR       REAL                                 REFS    2*124      126      127  DEFINED      122
11465  ZI        REAL          ARRAY                  REFS       10      155      162  DEFINED      143      155
11131  ZR        REAL          ARRAY                  REFS       10      154      162  DEFINED      142      154
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS         REFERENCES
       BUCK                   11              50
       GGCHK                  13              56
       RNRW                    3             148
       SQRT          REAL      1 LIBRARY     117       129
       TRFR                   16              59

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE   REFERENCES
       AIMAG         REAL      1  INTRIN                  113
       REAL          REAL      1  INTRIN                  112

STATEMENT LABELS                DEF LINE    REFERENCES
  420  1                           103         100
    0  2                            58          57
```

```
STATEMENT LABELS                  DEF LINE   REFERENCES
   211   4                           67         61        64
  1204   6        FMT               170        137
   307   9                           82         67
   442   10                         111        109
  1213   11       FMT               171        106       134
   410   12                          99         78        81        93
  1221   13       FMT               172        136
   532   14                         136        133
  1225   100      FMT               173        107       135       161
    74   213                         56         51
  1233   214      FMT               174         53
  1245   215      FMT               176         54
  1251   221      FMT               177         75        90
  1265   222      FMT               179         76        91
  1275   223      FMT               181         77        92
  1302   224      FMT               182         79        94
  1326   225      FMT               186         80        95
     0   230                        114        111
  1334   307      FMT               187         88
   665   347                        164         55        99       101
     0   348                         47         45        46
     0   455          INACTIVE      119        118
     0   456                        143        141
   467   460                        121        116      2*118
     0   465                        130        125
   627   466                        157        147       151
     0   467                        152        150
     0   468                        155        153
   610   469                        153        149
   662   470                        163        108       110       140
  1355   609      FMT               191        162
  1370   611      FMT               194        138
  1377   804      FMT               196         73
  1417   805      FMT               200         74
  1425   1138     FMT               201         83
  1431   1139     FMT               202         68

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
    31  348      I            45  47       17B                NOT INNER
    41  348      J            46  47        3B      INSTACK
   105  2        IB           57  58        3B      INSTACK
   124           I            62  62       11B                EXT REFS
   142           I            63  63       11B                EXT REFS
   161           I            65  65       11B                EXT REFS
   177           I            66  66       11B                EXT REFS
   234           J            74  74       13B                EXT REFS
   270           I            80  80       15B                EXT REFS
   334           J            88  88       14B                EXT REFS
   371           I            95  95       15B                EXT REFS
   434  470      K           108 163      231B                EXT REFS  NOT INNER
   450  230      I           111 114        4B      INSTACK
   457  460      I           116 121       13B                EXT REFS
   477  465      I           125 130       15B                EXT REFS
   546           I           138 138       11B                EXT REFS
   564  456      I           141 143        3B      INSTACK
   575  466      J           147 157       35B                EXT REFS  NOT INNER
   603  467      JJ          150 152        5B      INSTACK     EXITS
```

```
LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
  617  468      I          153 155        5B     INSTACK
  651           I          162 162       10B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       FLUTAN       48                 0 FMACH  (1)              1 BETA    (1)           2 VBO     (30)
                                      32 RVBO   (15)            47 NRVBO   (1)
       FITR         41                 0 NOMI   (1)              1 NIND    (40)
       FLEXT      3242                 0 BB     (3200)        3200 OMG     (40)        3240 RHO     (1)
                                    3241 VB     (1)
       FLUTV         7                 0 VL     (1)              1 VH      (1)           2 FLO     (1)
                                       3 FHI    (1)              4 IE      (1)           5 NQZ     (1)
                                       6 NVTOT  (1)
       MODD       8041                 0 B      (3200)        3200 DETAD   (3200)      6400 WW      (1600)
                                    8000 BMG    (40)          8040 NC      (1)
       COMA         41                 0 LC     (40)            40 BR      (1)
       CTAPES       50                 0 ITAPES (50)

EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       A          3200                 0 VINFV  (3200)
B      B          3200                 0 RQ     (3200)           0 VECT    (3200)

STATISTICS
  PROGRAM LENGTH                20606B    8582
  CM LABELED COMMON LENGTH      26316B   11470
          52000B CM USED
```

```
                  SUM = P*A(1,I,N) + HOLD*A(2,I,N)                                    CQR       59
                  SUN = -P*A(2,I,N) + HOLD*A(1,I,N)                                   CQR       60
   60             A(1,I,N) = SNGL(SUN)                                                CQR       61
              210 A(2,I,N) = SNGL(SUM)                                                CQR       62
                  RETURN                                                              CQR       63
                  END                                                                 CQR       64


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  CQR            1           62

VARIABLES      SN  TYPE          RELOCATION
   0  A            REAL      ARRAY     F.P.     REFS       3     3*17      18      19      20    3*26    3*27
                                                 3*28   3*29     2*34      35      37      38      41      42
                                                   43   3*45     3*46    3*47    3*48      53      54      55
                                                   56   2*58     2*59  DEFINED      1      21      22      23
                                                   24     30       31      32      33      36      37      39
                                                   43     49       50      51      52      53      54      55
                                                   60     61
   0  DIM          INTEGER             F.P.     REFS       2        3  DEFINED      1
 212  HOLD         REAL                         REFS      58       59  DEFINED     35
 205  I            INTEGER                      REFS    3*26     3*27    3*28    3*29      30      31      32
                                                   33   3*45     3*46    3*47    3*48      49      50      51
                                                   52   2*58     2*59      60      61  DEFINED     25      44
                                                   57
   0  INTER        INTEGER   ARRAY     F.P.     REFS       2  DEFINED       1
 200  K            INTEGER                      REFS    6*17     2*18    2*19    2*20    2*21    2*22    2*23
                                                 2*24     25     3*26    3*27    3*28    3*29      30      31
                                                   32     33     2*41    2*42    4*43      44    3*45    3*46
                                                 3*47   3*48       49      50      51      52    4*53    4*54
                                                 4*55   2*56  DEFINED      16      40
   0  M            INTEGER             F.P.     REFS      14  DEFINED       1
 176  N            INTEGER                      REFS      15     4*34    2*35    2*36    4*37      57    2*58
                                                 2*59     60       61  DEFINED     14
 177  N1           INTEGER                      REFS      16       25      40  DEFINED     15
 202  P            REAL                         REFS      22       26      27      28      29      45      46
                                                   47     48       55      58      59  DEFINED     18      38
                                                   56
 203  Q            REAL                         REFS      23       26      27      28      29      45      46
                                                   47     48       54  DEFINED     19      41
 204  R            REAL                         REFS      24       26      27      28      29      45      46
                                                   47     48       53  DEFINED     20      42
 201  S            REAL                         REFS      18       19      20      21      35      36      37
                                                DEFINED   17       34
 206  SUM          REAL                         REFS      30       49      61  DEFINED     26      45      58
 207  SUN          REAL                         REFS      31       50      60  DEFINED     27      46      59
 210  SUO          REAL                         REFS      32       51  DEFINED     28      47
 211  SUP          REAL                         REFS      33       52  DEFINED     29      48

EXTERNALS          TYPE    ARGS       REFERENCES
     SQRT          REAL      1 LIBRARY     17        34
```

```
      SUBROUTINE CQR(A,M,DIM,INTER)                                    CQR    2
      INTEGER DIM,INTER(1)                                             CQR    3
      DIMENSION A(2,DIM,1)                                             CQR    4
C                                                                      CQR    5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    CQR    6
C     DOUBLE PRECISION SUM,SUN,SUO,SUP                                 CQR    7
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       CQR    8
C                                                                      CQR    9
C                                                                      CQR   10
CCDC                                                                   CQR   11
      SNGL(X) = X                                                      CQR   12
CCDC                                                                   CQR   13
C                                                                      CQR   14
      N = M                                                            CQR   15
      N1 = N - 1                                                       CQR   16
      DO 100  K = 1,N1                                                 CQR   17
      S = SQRT(A(1,K,K)**2 + A(2,K,K)**2 + A(1,K+1,K)**2)              CQR   18
      P = A(1,K,K) / S                                                 CQR   19
      Q = A(2,K,K) / S                                                 CQR   20
      R = A(1,K+1,K) / S                                               CQR   21
      A(1,K,K) = S                                                     CQR   22
      A(2,K,K) = P                                                     CQR   23
      A(1,K+1,K) = Q                                                   CQR   24
      A(2,K+1,K) = R                                                   CQR   25
      DO 100  I = K,N1                                                 CQR   26
      SUM = P*A(1,K,I+1) + Q*A(2,K,I+1) + R*A(1,K+1,I+1)               CQR   27
      SUN = P*A(1,K+1,I+1) - Q*A(2,K+1,I+1) - R*A(1,K,I+1)             CQR   28
      SUO = P*A(2,K,I+1) - Q*A(1,K,I+1) + R*A(2,K+1,I+1)               CQR   29
      SUP = P*A(2,K+1,I+1) + Q*A(1,K+1,I+1) - R*A(2,K,I+1)             CQR   30
      A(1,K,I+1) = SNGL(SUM)                                           CQR   31
      A(1,K+1,I+1) = SNGL(SUN)                                         CQR   32
      A(2,K,I+1) = SNGL(SUO)                                           CQR   33
  100 A(2,K+1,I+1) = SNGL(SUP)                                         CQR   34
      S = SQRT(A(1,N,N)**2 + A(2,N,N)**2) + 1.E-50                     CQR   35
      HOLD = A(1,N,N) / S                                              CQR   36
      A(1,N,N) = S                                                     CQR   37
      A(2,N,N) = A(2,N,N) / S                                          CQR   38
      P = A(2,1,1)                                                     CQR   39
      A(2,1,1) = 0.                                                    CQR   40
      DO 200  K = 1,N1                                                 CQR   41
      Q = A(1,K+1,K)                                                   CQR   42
      R = A(2,K+1,K)                                                   CQR   43
      A(2,K+1,K) = A(2,K+1,K+1)                                        CQR   44
      DO 150  I = 1,K                                                  CQR   45
      SUM = P*A(1,I,K) - Q*A(2,I,K) + R*A(1,I,K+1)                     CQR   46
      SUN = P*A(1,I,K+1) + Q*A(2,I,K+1) - R*A(1,I,K)                   CQR   47
      SUO = P*A(2,I,K) + Q*A(1,I,K) + R*A(2,I,K+1)                     CQR   48
      SUP = P*A(2,I,K+1) - Q*A(1,I,K+1) - R*A(2,I,K)                   CQR   49
      A(1,I,K) = SNGL(SUM)                                             CQR   50
      A(1,I,K+1) = SNGL(SUN)                                           CQR   51
      A(2,I,K) = SNGL(SUO)                                             CQR   52
  150 A(2,I,K+1) = SNGL(SUP)                                           CQR   53
      A(1,K+1,K) = A(1,K+1,K+1) * R                                    CQR   54
      A(2,K+1,K+1) = -A(1,K+1,K+1)*Q                                   CQR   55
      A(1,K+1,K+1) = A(1,K+1,K+1) * P                                  CQR   56
  200 P = A(2,K+1,K)                                                   CQR   57
      DO 210  I = 1,N                                                  CQR   58
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
    0  130        INACTIVE       48        2*47
  152  140                       49         46        47
    0  150        INACTIVE       51        2*50
    0  160        INACTIVE       52        2*51
  163  170                       54         51
    0  180        INACTIVE       55         54
  167  185                       57         54
  200  190                       59         54
    0  200        INACTIVE       62         61
  232  210                       64        2*61
  243  220                       65         56        58        63
    0  230                       66         65
    0  240        INACTIVE       67
    0  250        INACTIVE       68
    0  260                       69         68
    0  270        INACTIVE       70
  360  280                       79         71
  363  290                       80         41        44        2*79
    0  310                       74         73
    0  320                       77         75        76

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   22  80        I           18 34        63B                EXT REFS  NOT INNER
   56  60        J           29 30         5B       INSTACK
   73  70        J           32 33         6B       INSTACK
  146  140       I           46 49         6B       INSTACK
  252  230       I           65 66         4B       INSTACK
  300  260       I           68 69         4B       INSTACK
  320  310       I           73 74         4B       INSTACK
  327  320       I           75 77        20B                NOT INNER
  336  320       J           76 77         5B       INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      CTAPES         50                O ITAPES (50)

EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      Z               2                O X      (1)               O XX     (2)               1 Y      (1)
      W               2                O U      (1)               O UU     (2)               1 V      (1)

STATISTICS
  PROGRAM LENGTH                   463B      307
  CM LABELED COMMON LENGTH          62B       50
        52000B CM USED
```

```
VARIABLES      SN  TYPE              RELOCATION
  440  J            INTEGER                          REFS      2*30     2*33     2*77  DEFINED       29       32       76
  446  K            INTEGER                          REFS        51  DEFINED       45
  374  LIM          INTEGER                          REFS        79  DEFINED        8
  441  LN           INTEGER                          REFS        41     3*42       43       44       46       50     6*57
                                                     4*59      4*60     2*62     2*64       65       67       68       73
                                                       75        76     5*78       80  DEFINED       36       43
  442  LO           INTEGER                          REFS        67  DEFINED       37       52
  443  L1           INTEGER                          REFS        41       45       50       51       52       53       65
                                                     2*67        68       75       78  DEFINED       38       48
  444  L2           INTEGER                          REFS        46       73  DEFINED       39       53
    0  M            INTEGER                F.P.      REFS        11       12       71  DEFINED        1
  436  N            INTEGER                          REFS        18       29     6*35       36  DEFINED       12
    0  NIX          INTEGER                F.P.   DEFINED         1       80
    0  ROOT         COMPLEX      ARRAY     F.P.      REFS         5  DEFINED        1       42
    0  TOL          REAL                   F.P.      REFS        47  DEFINED        1
  447  TOP          REAL                             REFS        74       77       78  DEFINED       72       74       77
  452  U            REAL                             REFS         6       24       27       28       61
                                                  DEFINED        21       25       28
  452  UU           REAL         ARRAY               REFS         4      2*6
  453  V            REAL                             REFS         6       31       61  DEFINED       22       27       31
  452  W            COMPLEX                          REFS         5        6       19       23       30       33       55
                                                       62        64       66       69  DEFINED       17       35       55
                                                       57        60       62       64
  450  X            REAL                             REFS         6       28       61
  450  XX           REAL         ARRAY               REFS         4      2*6
  451  Y            REAL                             REFS         6       27       61
  450  Z            COMPLEX                          REFS         5        6       21       60       62       64
                                                  DEFINED        20       59
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       CABS         REAL      1 LIBRARY      21
       CQR                    4              67
       CSQRT        COMPLEX   1 LIBRARY      60

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       ABS          REAL      1  INTRIN              47        74     2*77
       AIMAG        REAL      1  INTRIN              77
       AMAX1        REAL      0  INTRIN              74        77
       CMPLX        COMPLEX   2  INTRIN              35        57       60
       CONJG        COMPLEX   1  INTRIN              20        55
       IABS         INTEGER   1  INTRIN              12
       REAL         REAL      1  INTRIN            2*35        47     2*57       60       74       77
       SIZE         REAL      1    SF        9       77

STATEMENT LABELS             DEF LINE   REFERENCES
  411   10      FMT              85        11
  426   20      FMT              88        78
    0   40          INACTIVE     25        24
   44   50                       27      2*24
    0   60                       30        29
    0   70                       33        32
  102   80                       34        18        26
  117   90                       37      2*44
    0  100          INACTIVE     41
  125  110                       42        41        50
  136  120                       45        41        79
```

```
      GO TO 220                                                          VALCOM  59
  190 Z = (.5,0.) * (A(LN,LN) - A(LN-1,LN-1))                            VALCOM  60
      W = CSQRT(Z**2 + CMPLX(REAL(A(LN,LN-1)),0.)*A(LN-1,LN))            VALCOM  61
      IF (X*U + Y*V) 200,210,210                                         VALCOM  62
  200 W = A(LN,LN) - Z - W                                               VALCOM  63
      GO TO 220                                                          VALCOM  64
  210 W = A(LN,LN) - Z + W                                               VALCOM  65
  220 DO 230  I = L1,LN                                                  VALCOM  66
  230 A(I,I) = A(I,I) - W                                                VALCOM  67
  240 CALL CQR(A(L1,L1),LN-LO,DIM,INTER)                                 VALCOM  68
  250 DO 260  I = L1,LN                                                  VALCOM  69
  260 A(I,I) = A(I,I) + W                                                VALCOM  70
  270 ITER8 = ITER8 + 1                                                  VALCOM  71
      IF (M .GT. 0) GO TO 280                                            VALCOM  72
      TOP = 0.                                                           VALCOM  73
      DO 310  I = L2,LN                                                  VALCOM  74
  310 TOP = AMAX1(TOP,ABS(REAL(A(I,I-1))))                               VALCOM  75
      DO 320  I = L1,LN                                                  VALCOM  76
      DO 320  J = I,LN                                                   VALCOM  77
  320 TOP = AMAX1(TOP,SIZE(A(I,J)))                                      VALCOM  78
      WRITE (ITAPEW,20) ITER8,L1,LN,TOP,A(LN,LN-1),A(LN,LN)              VALCOM  79
  280 IF (ITER8 - LIM) 120,290,290                                       VALCOM  80
  290 NIX = LN                                                           VALCOM  81
C                                                                        VALCOM  82
C                                                                        VALCOM  83
C FORMATS                                                                VALCOM  84
C                                                                        VALCOM  85
   10 FORMAT (1H1, 23HOPTIONAL OUTPUT BY BUCK,/1HO, 28H ITER.  1ST LAST  VALCOM  86
     1  MAX. ELT.,13X,  8HA(N,N-1),22X, 6HA(N,N),/,16H  NO.   ROW  ROW,  VALCOM  87
     2  /,1HO)                                                           VALCOM  88
   20 FORMAT (3I5,1PE14.4,2(E16.5,E13.5))                                VALCOM  89
C                                                                        VALCOM  90
      RETURN                                                             VALCOM  91
       END                                                               VALCOM  92
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  VALCOM        1            90

VARIABLES      SN  TYPE              RELOCATION
    0  A            COMPLEX     ARRAY    F.P.     REFS        5       19       20       30        33     3*35      42
                                                    47     3*57     2*59     2*60       62        64       66      67
                                                    69       74     2*77     2*78   DEFINED        1       19      23
                                                    30       33       66       69
    0  DIM          INTEGER              F.P.     REFS        2        5       67   DEFINED        1
  437  I            INTEGER                       REFS     4*19     2*20     2*23       29      2*30       32    2*33
                                                  2*47       48     4*66     4*69     2*74        76     2*77
                                               DEFINED       18       46       65       68        73       75
    0  INTER        INTEGER              F.P.     REFS       67   DEFINED       1
    0  ITAPES       INTEGER     ARRAY    CTAPES   REFS        3        7       10
  435  ITAPEW       INTEGER                    DEFINED       10   I/O REFS      11       78
  445  ITER8        INTEGER                       REFS       54       70       78       79   DEFINED       40      70
```

```
      SUBROUTINE VALCOM(A,M,ROOT,INTER,DIM,TOL,NIX)                     VALCOM   2
      INTEGER DIM                                                       VALCOM   3
      DIMENSION ITAPES(50)                                              VALCOM   4
      DIMENSION          XX(2) ,         UU(2)                          VALCOM   5
      COMPLEX A(DIM,1),ROOT(1),Z,W                                      VALCOM   6
      EQUIVALENCE  (Z,X,XX(1)) , (Y,XX(2)) , (W,U,UU(1)) , (V,UU(2))    VALCOM   7
      COMMON /CTAPES/ ITAPES                                            VALCOM   8
      DATA LIM /50/                                                     VALCOM   9
      SIZE(W) = ABS(REAL(W)) + ABS(AIMAG(W))                            VALCOM  10
      ITAPEW =  ITAPES(6)                                               VALCOM  11
      IF (M .LT. 0) WRITE (ITAPEW,10)                                   VALCOM  12
      N = IABS(M)                                                       VALCOM  13
C                                                                       VALCOM  14
C BEGIN BY SCALING TO INSURE REAL SUBDIAGONAL ELEMENTS. THE QR FACTORI- VALCOM  15
C  ZATION WILL KEEP THESE ELEMENTS REAL.                                VALCOM  16
C                                                                       VALCOM  17
      W = (1.,0.)                                                       VALCOM  18
      DO 80  I = 2,N                                                    VALCOM  19
      A(I,I-1) = A(I,I-1) * W                                           VALCOM  20
      Z = CONJG(A(I,I-1))                                               VALCOM  21
      U = CABS(Z)                                                       VALCOM  22
      V = 0.                                                            VALCOM  23
      A(I,I-1) = W                                                      VALCOM  24
      IF (U) 50,40,50                                                   VALCOM  25
   40 U = 1.0                                                           VALCOM  26
      GO TO 80                                                          VALCOM  27
   50 V = Y / U                                                         VALCOM  28
      U = X / U                                                         VALCOM  29
      DO 60  J = I,N                                                    VALCOM  30
   60 A(I,J) = W * A(I,J)                                               VALCOM  31
      V = -V                                                            VALCOM  32
      DO 70  J = 1,I                                                    VALCOM  33
   70 A(J,I) = A(J,I) * W                                               VALCOM  34
   80 CONTINUE                                                          VALCOM  35
      W = A(N,N) + CMPLX(.5*REAL(A(N,N-1)),.25*REAL(A(N,N-1)))          VALCOM  36
      LN = N                                                            VALCOM  37
   90 LO = 0                                                            VALCOM  38
      L1 = 1                                                            VALCOM  39
      L2 = 2                                                            VALCOM  40
      ITER8 = -1                                                        VALCOM  41
  100 IF (LN - L1) 290,110,120                                          VALCOM  42
  110 ROOT(LN) = A(LN,LN)                                               VALCOM  43
      LN = LN - 1                                                       VALCOM  44
      IF (LN)  90,290,90                                                VALCOM  45
  120 K = L1                                                            VALCOM  46
      DO 140  I = L2,LN                                                 VALCOM  47
      IF (ABS(REAL(A(I,I-1))) - TOL) 130,130,140                        VALCOM  48
  130 L1 = I                                                            VALCOM  49
  140 CONTINUE                                                          VALCOM  50
      IF (LN - L1) 150,110,150                                          VALCOM  51
  150 IF (L1 - K) 160,170,160                                           VALCOM  52
  160 LO = L1 - 1                                                       VALCOM  53
      L2 = L1 + 1                                                       VALCOM  54
  170 IF (ITER8) 180,185,190                                            VALCOM  55
  180 W = CONJG(W)                                                      VALCOM  56
      GO TO 220                                                         VALCOM  57
  185 W = A(LN,LN) + CMPLX(.25*REAL(A(LN,LN-1)),.25*REAL(A(LN,LN-1)))   VALCOM  58
```

```
VARIABLES       SN  TYPE              RELOCATION
    O  N            INTEGER                F.P.       REFS        13      69   DEFINED      1
  242  S            REAL                              REFS        72      73   DEFINED     70
  246  SI           REAL                              REFS        12
  245  SR           REAL           ARRAY              REFS        11      12       26      29       30       31
                                                   DEFINED        22      23
  241  T            REAL                              REFS        67      68       72      73   DEFINED     66      71
  243  X            REAL                              REFS        12      43       48      53       56       60      63
                                                      2*66        67      72       73  DEFINED      39       44      51
                                                        54        58      61       64      67
  243  XX           REAL           ARRAY              REFS        10    2*12
  244  Y            REAL                              REFS        12      43       44    2*66       68       72      73
                                                   DEFINED        42      65       68
  243  Z            REAL                              REFS        12

EXTERNALS           TYPE   ARGS         REFERENCES
      COMSCA                6               26         29

INLINE FUNCTIONS    TYPE   ARGS          DEF LINE  REFERENCES
      MINO          INTEGER  O   INTRIN               27

STATEMENT LABELS                 DEF LINE    REFERENCES
    O  100          INACTIVE        25          2*24
    O  110          INACTIVE        26          2*25
   37  130                          27            25
    O  140          INACTIVE        29            28
   53  160                          30            24        2*28
    O  170                          32            21
    O  180                          36            33
    O  190          INACTIVE        39            38
    O  200          INACTIVE        44            43
  114  210                          46            41        2*43
    O  220          INACTIVE        49          2*48
    O  230          INACTIVE        50          2*49
    O  240                          56            50
    O  250                          63            57
  157  260                          64            49
    O  270                          74            69
  204  280                          75            16        2*38       48

LOOPS   LABEL     INDEX      FROM-TO      LENGTH      PROPERTIES
   14   280       K          16  75        173B                  EXT REFS  NOT INNER
   21   170       I          21  32         42B                  EXT REFS
   71   180       I          33  36          3B         INSTACK
  107   210       I          41  46          7B         INSTACK
  133   240       J          50  56          5B         INSTACK
  151   250       I          57  63          5B         INSTACK
  174   270       I          69  74          7B         INSTACK

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
      Z               2               O X      (1)              O XX     (2)                1 Y      (1)
      SR              2               1 SI     (1)

STATISTICS
  PROGRAM LENGTH                 273B      187
        52000B CM USED
```

```
              X = A(1,I,K+1)                                      FLASH     59
              A(1,I,K+1) = A(1,I,LOC)                             FLASH     60
 60           A(1,I,LOC) = X                                      FLASH     61
              X = A(2,I,K+1)                                      FLASH     62
              A(2,I,K+1) = A(2,I,LOC)                             FLASH     63
          250 A(2,I,LOC) = X                                      FLASH     64
          260 X = A(1,K+1,K)                                      FLASH     65
 65           Y = -A(2,K+1,K)                                     FLASH     66
              T = X*X + Y*Y                                       FLASH     67
              X = X/T                                             FLASH     68
              Y = Y/T                                             FLASH     69
              DO 270  I = K2,N                                    FLASH     70
 70           S = A(1,I,K)                                        FLASH     71
              T = A(2,I,K)                                        FLASH     72
              A(1,I,K) = X*S - Y*T                                FLASH     73
              A(2,I,K) = X*T + Y*S                                FLASH     74
          270 CONTINUE                                            FLASH     75
 75       280 CONTINUE                                            FLASH     76
              RETURN                                              FLASH     77
              END                                                 FLASH     78


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  FLASH          1          76

VARIABLES      SN  TYPE            RELOCATION
   0  A            REAL      ARRAY    F.P.      REFS      10      22      23    2*26    2*29      34      35
                                                2*42      51      52      54      55      58      59      61
                                                  62      64      65      70      71 DEFINED       1      30
                                                  31      34      35      52      53      55      56      59
                                                  60      62      63      72      73
   0  DIM          INTEGER            F.P.      REFS       9      10      26      29 DEFINED       1
 235  I            INTEGER                      REFS      22      23      26      27      29      30      31
                                                2*34    2*35    2*42      45      58    2*59      60      61
                                                2*62      63      70      71      72      73
                                             DEFINED      21      33      41      57      69
   0  INTER        INTEGER   ARRAY    F.P.      REFS      10 DEFINED       1      17      47
 236  I2           INTEGER                      REFS      28      29 DEFINED      27
 240  J            INTEGER                      REFS      51    2*52      53      54    2*55      56
                                             DEFINED      50
 231  K            INTEGER                      REFS      17      18      19      20      22      23      29
                                                  30      31    2*34    2*35    2*42      47      51      52
                                                  54      55      58      59      61      62    2*64    2*65
                                                  70      71      72      73 DEFINED      16
 234  KL1          INTEGER                      REFS      24      26      27 DEFINED      20
 232  K1           INTEGER                      REFS    2*26      40      41      49 DEFINED      18
 233  K2           INTEGER                      REFS      69 DEFINED      19
 237  LOC          INTEGER                      REFS      47      49      52      53      55      56      59
                                                  60      62      63 DEFINED      40      45
 227  M            INTEGER                      REFS      15      16      21      33      41      50      57
                                             DEFINED      13
 230  MK           INTEGER                      REFS      25      26      37      38 DEFINED      15      37
```

```
      SUBROUTINE FLASH(A,N,DIM,INTER)                                   FLASH      2
COMPLEX REDUCTION TO HESSENBERG FORM BY ELEMENTARY SIMILARITY TRANSFORM- FLASH     3
C  ATIONS, WITH INTERCHANGES AND D.P. INNER PRODUCT ACCUMULATION.       FLASH      4
C                                                                       FLASH      5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     FLASH      6
C     DOUBLE PRECISION SR                                               FLASH      7
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        FLASH      8
C                                                                       FLASH      9
      INTEGER DIM                                                       FLASH     10
      DIMENSION     A(2,DIM,1) ,     INTER(1) ,        XX(2)            FLASH     11
      DIMENSION SR(2)                                                   FLASH     12
      EQUIVALENCE   (SI,SR(2)) , (Z,X,XX(1)) , (Y,XX(2))                FLASH     13
      M = N                                                             FLASH     14
C                                                                       FLASH     15
      MK = M - 1                                                        FLASH     16
      DO 280  K = 1,M                                                   FLASH     17
      INTER(K) = 1                                                      FLASH     18
      K1 = K + 1                                                        FLASH     19
      K2 = K + 2                                                        FLASH     20
      KL1 = K - 1                                                       FLASH     21
      DO 170  I = 1,M                                                   FLASH     22
      SR(1) = A(1,I,K)                                                  FLASH     23
      SR(2) = A(2,I,K)                                                  FLASH     24
      IF (KL1) 100,160,100                                              FLASH     25
  100 IF (MK) 110,130,110                                               FLASH     26
  110 CALL COMSCA(A(1,I,K1),A(1,K1,KL1),SR,MK,DIM,1)                    FLASH     27
  130 I2 = MINO(I-2,KL1)                                                FLASH     28
      IF (I2) 160,160,140                                               FLASH     29
  140 CALL COMSCA(A(1,I,1),A(1,2,K),SR,I2,DIM,1)                        FLASH     30
  160 A(1,I,K) = -SR(1)                                                 FLASH     31
      A(2,I,K) = -SR(2)                                                 FLASH     32
  170 CONTINUE                                                          FLASH     33
      DO 180  I = 1,M                                                   FLASH     34
      A(1,I,K) = -A(1,I,K)                                              FLASH     35
      A(2,I,K) = -A(2,I,K)                                              FLASH     36
  180 CONTINUE                                                          FLASH     37
      MK = MK - 1                                                       FLASH     38
      IF (MK) 280,280,190                                               FLASH     39
  190 X = 0.0                                                           FLASH     40
      LOC = K1                                                          FLASH     41
      DO 210  I = K1,M                                                  FLASH     42
      Y = A(1,I,K)**2 + A(2,I,K)**2                                     FLASH     43
      IF (X - Y) 200,210,210                                            FLASH     44
  200 X = Y                                                             FLASH     45
      LOC = I                                                           FLASH     46
  210 CONTINUE                                                          FLASH     47
      INTER(K) = LOC                                                    FLASH     48
      IF (X) 220,280,220                                                FLASH     49
  220 IF (LOC - K1) 230,260,230                                         FLASH     50
  230 DO 240 J = 1,M                                                    FLASH     51
      X = A(1,K+1,J)                                                    FLASH     52
      A(1,K+1,J) = A(1,LOC,J)                                           FLASH     53
      A(1,LOC,J) = X                                                    FLASH     54
      X = A(2,K+1,J)                                                    FLASH     55
      A(2,K+1,J) = A(2,LOC,J)                                           FLASH     56
  240 A(2,LOC,J) = X                                                    FLASH     57
      DO 250 I = 1,M                                                    FLASH     58
```

```
STATEMENT LABELS          DEF LINE   REFERENCES
  420  330                   112       2*102
    0  340                   114          83
  440  350                   122        2*79
  236  360                    73          64
    0  400                    71          67
    0  450                    70          68

LOOPS  LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
   21  130      I         36 41       30B               NOT INNER
   36  120      J         39 40        5B     INSTACK
   73  140      I         48 49        4B     INSTACK
  106           K         52 52       13B               EXT REFS
  125           K         53 53       11B               EXT REFS
  142  190      K         57 61       22B               NOT INNER
  152  180      J         58 60        5B     INSTACK
  202  400      I         67 71       22B               NOT INNER
  212  450      J         68 70        5B     INSTACK
  244  220      I         74 75        5B     INSTACK
  270  340      K         83 114     150B               EXT REFS  NOT INNER
  276           J         86 86       13B               EXT REFS
  315           I         87 87       11B               EXT REFS
  332  270      I         91 95       22B               NOT INNER
  342  260      J         92 94        5B     INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50              0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                634B      412
  CM LABELED COMMON LENGTH       62B       50
          52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                 DEFINED       1       112
  573  NUDGE        INTEGER                         REFS     110       112   DEFINED       99      110
  556  N1        *  INTEGER                      DEFINED      35
    O  ROOT         COMPLEX    ARRAY      F.P.      REFS      23        24        63       72       75       97     2*1C4
                                                     108  DEFINED        1       113
  551  TILT         COMPLEX                         REFS      23     2*106       107      108  DEFINED      105      107
    O  TOL          REAL                  F.P.      REFS      42   DEFINED         1
  554  TOP          REAL                            REFS      41        45        82  DEFINED       33       41
  575  TRACE        COMPLEX    ARRAY                REFS      23        37        49       75       76
                                                 DEFINED      32        37        47       49       73       75
  547  VALUE        COMPLEX                         REFS      23     2*104       113      114  DEFINED       97      108
    O  VECTOR       COMPLEX    ARRAY      F.P.      REFS      23        24       114  DEFINED        1
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE     ARGS        REFERENCES
       COMVEC                  7            114
       FLASH                   4             46
       RDM          REAL       1          2*105
       VALCOM                  7             63
       VALROM                  7             72

INLINE FUNCTIONS    TYPE     ARGS          DEF LINE  REFERENCES
       ABS          REAL       1  INTRIN                2*40     2*104     2*106
       AIMAG        REAL       1  INTRIN                  40       104       106
       AMAX1        REAL       O  INTRIN                  41        42
       AMIN1        REAL       O  INTRIN                  45
       CMPLX        COMPLEX    2  INTRIN                  32        47        73      105
       IABS         INTEGER    1  INTRIN                  34        80        81
       MINO         INTEGER    O  INTRIN                 112
       REAL         REAL       1  INTRIN                  40       104       106
       SIZE         REAL       1    SF         28         40       104       106

STATEMENT LABELS               DEF LINE    REFERENCES
  527  10       FMT              119           76
    O  100          INACTIVE      32
    O  110          INACTIVE      33
    O  120                        40           39
    O  130                        41           36
    O  140                        49           48
    O  150          INACTIVE      50
    O  160          INACTIVE      51           50
  140  170                        55           50
    O  180                        60           58
    O  190                        61           57
  164  200                        62           50          54
    O  210          INACTIVE      74
    O  220                        75           74
  260  230                        80           31          79
    O  240          INACTIVE      85         2*84
  330  250                        89           84
    O  260                        94           92
    O  270                        95           91
  354  280                        96           88
  362  290                       100          111
  363  300                       101          104
    O  310          INACTIVE     104          102
    O  320          INACTIVE     105        2*104
```

```
           C                                                           BUCK      116
           C                                                           BUCK      117
           C FORMATS                                                   BUCK      118
           C                                                           BUCK      119
              10 FORMAT (1HO,6X, 14HORIGINAL TRACE,15X, 16HHESSENBERG TRACE, 16X,  BUCK      120
                1         14HEIGENVALUE SUM,//1PE14.6,E14.6,2(E17.6,E14.6))    BUCK      121
           C                                                           BUCK      122
             350 RETURN                                                BUCK      123
                 END                                                   BUCK      124
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE      REFERENCES
   3  BUCK           1          122

VARIABLES      SN  TYPE              RELOCATION
   O  A            COMPLEX   ARRAY     F.P.      REFS      23      24      37    2*40      46      49      52
                                                   53      59      63      72     114 DEFINED       1      69
                                                   86      87      93
   O  COPY         COMPLEX   ARRAY     F.P.      REFS      23      24      69      93 DEFINED       1      59
   O  DIM          INTEGER             F.P.      REFS      22    2*24      46      63      72     114
                                              DEFINED       1
 560  EPS          REAL                          REFS      40      41      45      63      72     106     109
                                              DEFINED      38      40      42      45      96     109
 574  FACT         REAL                          REFS     107 DEFINED     106
 571  GAP          REAL                          REFS      96     104     114 DEFINED      82
 557  I            INTEGER                       REFS    2*37    2*40    2*49      59      60      69      71
                                                   75      86    2*87      93      95     101     102   2*104
                                              DEFINED      36      48      55      60      67      74      86
                                                   87      91     100     101
 572  IJ           INTEGER                       REFS      93      94 DEFINED      90      94
 566  IL           INTEGER                       REFS      69      70 DEFINED      66      70
   O  INTER        INTEGER   ARRAY     F.P.      REFS      24      46      63      72     114
                                              DEFINED       1
   O  ITAPES       INTEGER   ARRAY     CTAPES    REFS      26      27      29
 553  ITAPEW       INTEGER                    DEFINED      29 I/O REFS      76
 561  J            INTEGER                       REFS    2*40      52      59      69    2*86      93
                                              DEFINED      39      52      58      68      86      92
 563  K            INTEGER                       REFS    2*52    2*53      59      61      97     102     105
                                                  108     113     114 DEFINED      52      53      57      83
   O  KEY          INTEGER             F.P.      REFS      31    2*79      81 DEFINED       1
   O  KOPY         INTEGER             F.P.      REFS      50      51      80      84 DEFINED       1
 564  L            INTEGER                       REFS      58      92     105 DEFINED      56      61      89
                                                   95
 567  LIM1         INTEGER                       REFS      81      83 DEFINED      80
 570  LIM2         INTEGER                       REFS      83 DEFINED      81
 565  LL           INTEGER                       REFS      68 DEFINED      65      71
 562  L1           INTEGER                    DEFINED      51 I/O REFS      52      53      85      86      87
   O  M            INTEGER             F.P.      REFS      34      63      72      76 DEFINED       1
 555  N            INTEGER                       REFS      35      36      39      46      48      52      53
                                                   57      58      67      68      74      86      87      91
                                                   92     114 DEFINED      34
   O  NIX          INTEGER             F.P.      REFS      63      64      72      79     112
```

```
      DO 180  J = L,N
      COPY(I) = A(K,J)
  180 I = I + 1
  190 L = K
  200 CONTINUE
      CALL VALCOM(A,M,ROOT,INTER,DIM,EPS,NIX)
      IF(NIX.LE.O)GO TO 360
      LL = 1
      IL = 1
      DO 400 I = 1,N
      DO 450 J = LL,N
      A(I,J) = COPY(IL)
  450 IL = IL + 1
  400 LL = I
      CALL VALROM(A,M,ROOT,INTER,DIM,EPS,NIX)
  360 TRACE(3) = CMPLX(0.0,0.0)
  210 DO 220  I = 1,N
  220 TRACE(3) = TRACE(3) + ROOT(I)
      IF (M .LT. 0) WRITE (ITAPEW,10) TRACE
C  NIX IS SET TO THE NUMBER OF MISSING ROOTS, SO NIX = 0 SHOWS SUCCESS.
C  RETURN IF NIX IS POSITIVE (VALCOM FAILURE) OR KEY = 0 (NO VECTORS.)
      IF (KEY*NIX - KEY) 230,350,350
  230 LIM1 = IABS(KOPY)
      LIM2 = IABS(KEY) + LIM1 - 1
      GAP = TOP * 1.E-7
      DO 340  K = LIM1,LIM2
      IF (KOPY) 240,240,250
  240 REWIND L1
      READ (L1) ((A(I,J), I = 1,J), J = 1,N)
      READ (L1) (A(I,I-1), I = 2,N)
      GO TO 280
  250 L = 1
      IJ = 1
      DO 270  I = 1,N
      DO 260  J = L,N
      A(I,J) = COPY(IJ)
  260 IJ = IJ + 1
  270 L = I
  280 EPS = GAP
      VALUE = ROOT(K)
C  MAKE SURE ROOT(K) DIFFERS FROM EARLIER ROOTS BY NOTICEABLE AMOUNT.
      NUDGE = 0
  290 I = 0
  300 I = I + 1
      IF (I - K) 310,330,330
C  VALUE IS SHIFTED A LITTLE TO GET AWAY FROM ROOT(I).
  310 IF (SIZE(VALUE - ROOT(I)) - GAP) 320,320,300
  320 TILT = CMPLX(RDM(K)-.5,RDM(L)-.5)
      FACT = EPS / SIZE(TILT)
      TILT = FACT * TILT
      VALUE = ROOT(K) + TILT
      EPS = EPS * 1.2
      NUDGE = NUDGE - 1
      GO TO 290
  330 NIX = MINO(NIX,NUDGE)
      ROOT(K) = VALUE
  340 CALL COMVEC(A,N,VALUE,INTER,DIM,VECTOR(1,K),GAP)
```

```
      SUBROUTINE BUCK(A,M,ROOT,KEY,INTER,DIM,VECTOR,KOPY,COPY,TOL,NIX)
C
C  MASTER ROUTINE FOR EIGENVALUES AND EIGENVECTORS OF IN-CORE COMPLEX
C    MATRICES.  VECTOR CALCULATION IS OPTIONAL, AND IF IT IS NOT WANTED,
C    NO SERIOUS STORAGE ALLOCATION NEED BE MADE FOR IT.  THE MATRIX IS
C    INITIALLY REDUCED TO UPPER HESSENBERG FORM AND ITS ROOTS ARE FOUND
C    BY THE LR ALGORITHM. IF KEY = 0, VECTORS ARE NOT OBTAINED. OTHER-
C    WISE, THE ROUTINE SEEKS ABS(KEY) VECTORS, STARTING WITH THE ONE
C    CORRESPONDING TO ABS(KOPY).  VECTORS ARE FOUND BY THE WIELANDT
C    ITERATION ON THE HESSENBERG FORM, AND THIS FORM MUST BE RESTORED P
C    TIMES IF P VECTORS ARE WANTED.  FOR OPTIMUM SPEED, MAKE KOPY POS.
C    AND THE ARRAY COPY WILL BE USED TO STORE THE HESSENBERG MATRIX. FOR
C    MINIMUM STORAGE USE  SET KOPY NEG. AND THE ARRAY COPY WILL NOT BE
C    USED (OR NEEDED), AND THE H-MATRIX WILL BE HELD ON TAPE 11. IF KOPY
C    IS POS., THEN COPY MUST BE DIMENSIONED TO AT LEAST 1/2  OF MSQ+3M,
C    OTHERWISE DIMENSION 1 (COMPLEX) IS O.K.  SIMILARLY, THE ARRAY VEC-
C    TOR MAY CONSIST OF ONE COLUMN OR MANY.  IF KEY IS NEG., THE HESSEN-
C    BERG REDUCTION AND EIGENVALUE CALCULATION ARE SKIPPED, SO THE ROU-
C    TINE MAY BE ENTERED MANY TIMES, ONCE FOR THE ROOTS, AND THEN ONCE
C    FOR EACH DESIRED VECTOR.
C
      INTEGER DIM
      COMPLEX A,ROOT,VECTOR,COPY,TRACE(3),VALUE,TILT
      DIMENSION A(DIM,1),ROOT(1),VECTOR(DIM,1),INTER(1),COPY(1)
C
      DIMENSION ITAPES(50)
      COMMON /CTAPES/ ITAPES
      SIZE(VALUE) = ABS(REAL(VALUE)) + ABS(AIMAG(VALUE))
      ITAPEW =  ITAPES(6)
C
      IF (KEY .LT. 0)  GO TO 230
  100 TRACE(1) = CMPLX(0.0,0.0)
  110 TOP = 0.
      N = IABS(M)
      N1 = N - 1
      DO 130  I = 1,N
      TRACE(1) = TRACE(1) + A(I,I)
      EPS = 0.
      DO 120  J = 1,N
  120 EPS = EPS + SIZE(A(I,J))
  130 TOP = AMAX1(TOP,EPS)
      EPS = AMAX1(TOL,1.E-14)
C  AFTER REDUCTION TO HESSENBERG FORM, SUBDIAGONAL ELEMENTS SMALLER THAN
C    EPS ARE REGARDED AS NEGLIGIBLE.
      EPS = AMIN1(1.E-5,EPS) * TOP
      CALL FLASH(A,N,DIM,INTER)
      TRACE(2) = CMPLX(0.0,0.0)
      DO 140  I = 1,N
  140 TRACE(2) = TRACE(2) + A(I,I)
  150 IF (KOPY) 160,200,170
  160 L1 = -KOPY
      WRITE (L1) ((A(J,K), J = 1,K), K = 1,N)
      WRITE (L1) (A(K,K-1), K = 2,N)
      GO TO 200
  170 I = 1
      L = 1
      DO 190  K = 1,N
```

```
INLINE FUNCTIONS    TYPE    ARGS        DEF LINE  REFERENCES
       SNGL         REAL     1    SF       11        30       31       32       33       49       50       51       52
                                                     60       61

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100                       33         16        25
    0  150                       52         44
    0  200                       56         40
    0  210                       61         57

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
   14  100       K            16 33       47B                 EXT REFS  NOT INNER
   40  100       I            25 33       20B          OPT
  104  200       K            40 56       52B                 NOT INNER
  121  150       I            44 52       20B          OPT
  164  210       I            57 61        7B        INSTACK

STATISTICS
  PROGRAM LENGTH                 226B       150
          52000B CM USED
```

```
            SUBROUTINE VALROM(A,M,ROOT,INTER,DIM,TOL,NIX)                         VALROM     2
            DIMENSION ITAPES(50)                                                  VALROM     3
            DIMENSION          XX(2) ,         UU(2)                              VALROM     4
            INTEGER DIM,INTER(1)                                                  VALROM     5
            COMPLEX A(DIM,1),ROOT(1),Z,W                                          VALROM     6
            EQUIVALENCE  (Z,X,XX(1)) , (Y,XX(2)) , (W,U,UU(1)) , (V,UU(2))        VALROM     7
            COMMON /CTAPES/ ITAPES                                                VALROM     8
            DATA LIM /50/                                                         VALROM     9
            SIZE(W) = ABS(REAL(W)) + ABS(AIMAG(W))                                VALROM    10
            ITAPEW =  ITAPES(6)                                                   VALROM    11
            IF (M .LT. 0) WRITE (ITAPEW,10)                                       VALROM    12
            N = IABS(M)                                                           VALROM    13
            W = A(N,N) - (.5,.25) * A(N,N-1)                                      VALROM    14
            LN = N                                                                VALROM    15
         90 LO = 0                                                                VALROM    16
            L1 = 1                                                                VALROM    17
            L2 = 2                                                                VALROM    18
            ITER8 = -1                                                            VALROM    19
        100 IF (LN - L1) 290,110,120                                              VALROM    20
        110 ROOT(LN) = A(LN,LN)                                                   VALROM    21
            LN = LN - 1                                                           VALROM    22
            IF (LN)  90,290,90                                                    VALROM    23
        120 K = L1                                                                VALROM    24
            DO 140  I = L2,LN                                                     VALROM    25
            IF (SIZE(A(I,I-1)) - TOL) 130,130,140                                 VALROM    26
        130 L1 = I                                                                VALROM    27
        140 CONTINUE                                                              VALROM    28
            IF (LN - L1) 150,110,150                                              VALROM    29
        150 IF (L1 - K) 160,170,160                                               VALROM    30
        160 LO = L1 - 1                                                           VALROM    31
            L2 = L1 + 1                                                           VALROM    32
        170 IF (ITER8) 180,185,190                                                VALROM    33
        180 W = CONJG(W)                                                          VALROM    34
            GO TO 220                                                             VALROM    35
        185 W = A(LN,LN) + (0.,.25)*A(LN,LN-1)                                    VALROM    36
            GO TO 220                                                             VALROM    37
        190 Z = (.5,0.) * (A(LN,LN) - A(LN-1,LN-1))                               VALROM    38
            W = CSQRT(Z**2 + A(LN,LN-1)*A(LN-1,LN))                               VALROM    39
            IF (X*U + Y*V) 200,210,210                                            VALROM    40
        200 W = A(LN,LN) - Z - W                                                  VALROM    41
            GO TO 220                                                             VALROM    42
        210 W = A(LN,LN) - Z + W                                                  VALROM    43
        220 DO 230  I = L1,LN                                                     VALROM    44
        230 A(I,I) = A(I,I) - W                                                   VALROM    45
        240 CALL CLR(A(L1,L1),LN-LO,DIM,INTER)                                    VALROM    46
        250 DO 260  I = L1,LN                                                     VALROM    47
        260 A(I,I) = A(I,I) + W                                                   VALROM    48
        270 ITER8 = ITER8 + 1                                                     VALROM    49
            IF (M .GT. 0) GO TO 280                                               VALROM    50
            TOP = 0.                                                              VALROM    51
            DO 310  I = L2,LN                                                     VALROM    52
        310 TOP = AMAX1(TOP,SIZE(A(I,I-1)))                                       VALROM    53
            DO 320  I = L1,LN                                                     VALROM    54
            DO 320  J = I,LN                                                      VALROM    55
        320 TOP = AMAX1(TOP,SIZE(A(I,J)))                                         VALROM    56
            WRITE (ITAPEW,20) ITER8,L1,LN,TOP,A(LN,LN-1),A(LN,LN)                 VALROM    57
        280 IF (ITER8 - LIM) 120,290,290                                          VALROM    58
```

```
      290 NIX = LN                                                        VALROM     59
    C                                                                     VALROM     60
    C                                                                     VALROM     61
    C FORMATS                                                             VALROM     62
    C                                                                     VALROM     63
       10 FORMAT (1H1, 23HOPTIONAL OUTPUT BY BUCK,/1HO, 28H ITER.  1ST LAST VALROM     64
         1  MAX. ELT.,13X,  8HA(N,N-1),22X, 6HA(N,N),/,16H  NO.   ROW  ROW, VALROM     65
          2  /,1HO)                                                        VALROM     66
       20 FORMAT (3I5,1PE14.4,2(E16.5,E13.5))                              VALROM     67
    C                                                                     VALROM     68
          RETURN                                                          VALROM     69
           END                                                            VALROM     70
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  VALROM         1           68

VARIABLES      SN  TYPE              RELOCATION
    O  A           COMPLEX    ARRAY     F.P.       REFS       5     2*13      20     2*25     2*35     2*37     2*38
                                                     40      42       44      45       47     2*52     2*55     2*56
                                                DEFINED       1       44      47
    O  DIM         INTEGER              F.P.       REFS       4        5      45  DEFINED        1
  371  I           INTEGER                         REFS    4*25       26    4*44     4*47     4*52       54     2*55
                                                DEFINED      24       43      46       51       53
    O  INTER       INTEGER    ARRAY     F.P.       REFS       4       45  DEFINED        1
    O  ITAPES      INTEGER    ARRAY     CTAPES     REFS       2        7      10
  361  ITAPEW      INTEGER                      DEFINED      10 I/O REFS      11       56
  367  ITER8       INTEGER                         REFS      32       48      56       57  DEFINED       18       48
  373  J           INTEGER                         REFS    2*55  DEFINED      54
  370  K           INTEGER                         REFS      29  DEFINED      23
  317  LIM         INTEGER                         REFS      57  DEFINED       8
  363  LN          INTEGER                         REFS      19     3*20      21       22       24       28     4*35
                                                   4*37    4*38     2*40    2*42       43       45       46       51
                                                     53      54     5*56      58  DEFINED       14       21
  364  LO          INTEGER                         REFS      45  DEFINED      15       30
  365  L1          INTEGER                         REFS      19       23      28       29       30       31       43
                                                   2*45      46       53      56  DEFINED       16       26
  366  L2          INTEGER                         REFS      24       51 DEFINED       17       31
    O  M           INTEGER              F.P.       REFS      11       12      49  DEFINED        1
  362  N           INTEGER                         REFS    4*13       14 DEFINED       12
    O  NIX         INTEGER              F.P.    DEFINED       1       58
    O  ROOT        COMPLEX    ARRAY     F.P.       REFS       5  DEFINED       1       20
    O  TOL         REAL                 F.P.       REFS      25  DEFINED       1
  372  TOP         REAL                            REFS      52       55      56  DEFINED       50       52       55
  376  U           REAL                            REFS       6       39
  376  UU          REAL       ARRAY                REFS       3      2*6
  377  V           REAL                            REFS       6       39
  376  W           COMPLEX                         REFS       5        6      33       40       42       44       47
                                                DEFINED      13       33      35       38       40       42
  374  X           REAL                            REFS       6       39
  374  XX          REAL       ARRAY                REFS       3      2*6
  375  Y           REAL                            REFS       6       39
```

```
VARIABLES      SN  TYPE            RELOCATION
  374  Z           COMPLEX                              REFS         5        6        38       40       42
                                                        DEFINED      37
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS         REFERENCES
       CLR                     4             45
       CSQRT       COMPLEX     1 LIBRARY     38

INLINE FUNCTIONS     TYPE    ARGS          DEF LINE   REFERENCES
       ABS         REAL        1  INTRIN                 2*25      2*52      2*55
       AIMAG       REAL        1  INTRIN                  25        52        55
       AMAX1       REAL        0  INTRIN                  52        55
       CONJG       COMPLEX     1  INTRIN                  33
       IABS        INTEGER     1  INTRIN                  12
       REAL        REAL        1  INTRIN                  25        52        55
       SIZE        REAL        1    SF            9       25        52        55

STATEMENT LABELS                  DEF LINE    REFERENCES
  334  10       FMT                  63          11
  351  20       FMT                  66          56
   33  90                            15         2*22
    0  100          INACTIVE         19
   41  110                           20          19        28
   52  120                           23          19        57
    0  130          INACTIVE         26         2*25
   70  140                           27          24        25
    0  150          INACTIVE         29         2*28
    0  160          INACTIVE         30         2*29
  100  170                           32          29
    0  180          INACTIVE         33          32
  104  185                           35          32
  120  190                           37          32
    0  200          INACTIVE         40          39
  154  210                           42         2*39
  165  220                           43          34        36        41
    0  230                           44          43
    0  240          INACTIVE         45
    0  250          INACTIVE         46
    0  260                           47          46
    0  270          INACTIVE         48
  303  280                           57          49
  306  290                           58          19        22        2*57
    0  310                           52          51
    0  320                           55          53        54

LOOPS  LABEL    INDEX      FROM-TO     LENGTH     PROPERTIES
   63  140      I           24 27        6B        INSTACK
  174  230      I           43 44        4B        INSTACK
  222  260      I           46 47        4B        INSTACK
  242  310      I           51 52        5B        INSTACK
  252  320      I           53 55       20B                  NOT INNER
  261  320      J           54 55        5B        INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50                 0 ITAPES (50)
```

```
EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      Z            2              O X       (1)             O XX     (2)              1 Y       (1)
      W            2              O U       (1)             O UU     (2)              1 V       (1)

STATISTICS
  PROGRAM LENGTH                403B     259
  CM LABELED COMMON LENGTH       62B      50
          52000B CM USED
```

```
 1            SUBROUTINE CLR(A,M,MID,INTER)                                    CLR    2
              COMPLEX  A , Z , W                                               CLR    3
              DIMENSION        XX(2) ,       UU(2)                             CLR    4
              DIMENSION      A(MID,1) ,    INTER(1)                            CLR    5
 5            EQUIVALENCE  (Z,X,XX(1)) , (Y,XX(2)) , (W,U,UU(1)) , (V,UU(2))   CLR    6
              N = M                                                            CLR    7
              N1 = N - 1                                                       CLR    8
              DO 150  I = 1,N1                                                 CLR    9
              X = REAL(A(I,I))**2 + AIMAG(A(I,I))**2                           CLR   10
10            Y = REAL(A(I+1,I))**2  +  AIMAG(A(I+1,I))**2                     CLR   11
              IF (X - Y) 100,120,120                                           CLR   12
          100 INTER(I) = -INTER(I)                                             CLR   13
              X = Y                                                            CLR   14
              DO 110  J = I,N                                                  CLR   15
15            W = A(I,J)                                                       CLR   16
              A(I,J) = A(I+1,J)                                                CLR   17
          110 A(I+1,J) = W                                                     CLR   18
          120 IF (X) 130,150,130                                               CLR   19
          130 A(I+1,I) = A(I+1,I) / A(I,I)                                     CLR   20
20            DO 140  J = I,N1                                                 CLR   21
          140 A(I+1,J+1) = A(I+1,J+1) - A(I+1,I)*A(I,J+1)                      CLR   22
          150 CONTINUE                                                         CLR   23
              DO 210  I = 1,N1                                                 CLR   24
              W = A(I+1,I)                                                     CLR   25
25            IF (INTER(I)) 160,180,180                                        CLR   26
          160 DO 170  J = 1,I                                                  CLR   27
              Z = A(J,I)                                                       CLR   28
              A(J,I) = A(J,I+1)                                                CLR   29
          170 A(J,I+1) = Z                                                     CLR   30
30            A(I+1,I) = A(I+1,I+1)                                            CLR   31
              A(I+1,I+1) = 0.                                                  CLR   32
              INTER(I) = -INTER(I)                                             CLR   33
              GO TO 190                                                        CLR   34
          180 A(I+1,I) = W*A(I+1,I+1)                                          CLR   35
35        190 DO 200  J = 1,I                                                  CLR   36
          200 A(J,I) = A(J,I) + W*A(J,I+1)                                     CLR   37
          210 CONTINUE                                                         CLR   38
              RETURN                                                           CLR   39
               END                                                             CLR   40
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  CLR           1            38

VARIABLES     SN  TYPE          RELOCATION
   0  A           COMPLEX    ARRAY    F.P.     REFS        2      4     2*9    2*10    15     16    2*19
                                                3*21       24     27     28      30    34   2*36
                                             DEFINED        1     16     17      19    21     28      29
                                                  30       31     34     36
 172  I           INTEGER                       REFS      4*9   4*10   2*12      14    15   2*16      17
                                                6*19       20   5*21   2*24      25    26     27    2*28
                                                  29     4*30   2*31   2*32    4*34    35   3*36
```

```
VARIABLES     SN  TYPE           RELOCATION
                                              DEFINED       8        23
   O  INTER     INTEGER    ARRAY     F.P.       REFS        4        12       25       32    DEFINED       1        12
                                                 32
 173  J         INTEGER                         REFS       15      2*16       17     3*21       27      2*28        29
                                                3*36  DEFINED      14       20       26       35
   O  M         INTEGER              F.P.       REFS        6   DEFINED        1
   O  MID       INTEGER              F.P.       REFS        4   DEFINED        1
 170  N         INTEGER                         REFS        7        14  DEFINED        6
 171  N1        INTEGER                         REFS        8        20       23  DEFINED        7
 176  U         REAL                            REFS        5
 176  UU        REAL       ARRAY                REFS        3       2*5
 177  V         REAL                            REFS        5
 176  W         COMPLEX                         REFS        2         5       17       34       36
                                              DEFINED      15        24
 174  X         REAL                            REFS        5        11       18  DEFINED        9        13
 174  XX        REAL       ARRAY                REFS        3       2*5
 175  Y         REAL                            REFS        5        11       13  DEFINED       10
 174  Z         COMPLEX                         REFS        2         5       29  DEFINED       27

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
     AIMAG         REAL      1  INTRIN                 9        10
     REAL          REAL      1  INTRIN                 9        10

STATEMENT LABELS               DEF LINE   REFERENCES
   O  100       INACTIVE          12         11
   O  110                         17         14
  43  120                         18        2*11
   O  130       INACTIVE          19        2*18
   O  140                         21         20
  74  150                         22          8         18
   O  160       INACTIVE          26         25
   O  170                         29         26
 135  180                         34        2*25
 145  190                         35         33
   O  200                         36         35
   O  210                         37         23

LOOPS  LABEL    INDEX     FROM-TO     LENGTH     PROPERTIES
  14   150      I           8 22        63B                NOT INNER
  35   110      J          14 17         5B       INSTACK
  64   140      J          20 21         7B       INSTACK
 100   210      I          23 37        66B                NOT INNER
 116   170      J          26 29         6B       INSTACK
 154   200      J          35 36         7B       INSTACK

EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      Z               2               O X       (1)            O XX      (2)                1 Y       (1)
      W               2               O U       (1)            O UU      (2)                1 V       (1)

STATISTICS
  PROGRAM LENGTH                223B      147
      52000B CM USED
```

```
      SUBROUTINE COMVEC(A,M,ROOT,INTER,DIM,VECTOR,EPS)
      INTEGER DIM,INTER(1)
      COMPLEX A(DIM,1),ROOT,VECTOR(1),W
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C     COMPLEX*16 G
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      COMPLEX G
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      DIMENSION ITAPES(50)
      COMMON / CTAPES / ITAPES
      SIZE(W) = ABS(REAL(W)) + ABS(AIMAG(W))
C
C
      ITAPEW  =  ITAPES(6)
C
C
      BIG = .002 / EPS
      DELTA = 0.01 * EPS
      N = M
      N1 = N - 1
      A(1,1) = A(1,1) - ROOT
      VECTOR(1)=CMPLX(1.0,0.0)
      DO 150  I = 1,N1
      VECTOR(I+1)=CMPLX(1.0,0.0)
      A(I+1,I+1) = A(I+1,I+1) - ROOT
      X = REAL(A(I,I))**2  +  AIMAG(A(I,I))**2
      Y = REAL(A(I+1,I))**2  +  AIMAG(A(I+1,I))**2
      IF (X - Y) 100,120,120
  100 X = Y
      INTER(I) = -INTER(I)
      DO 110  J = I,N
      W = A(I,J)
      A(I,J) = A(I+1,J)
  110 A(I+1,J) = W
  120 IF (SIZE(A(I,I)) - DELTA) 130,130,140
  130 A(I,I) = CMPLX(DELTA,0.)
  140 W = A(I+1,I)/A(I,I)
      A(I+1,I) = W
      DO 150  J = I,N1
  150 A(I+1,J+1) = A(I+1,J+1) - W*A(I,J+1)
      IF (SIZE(A(N,N)) - DELTA) 160,160,170
  160 A(N,N) = CMPLX(DELTA,0.)
  170 L = 1
  190 KEY = 10
  200 VECTOR(N) = VECTOR(N) / A(N,N)
      I1 = N
      DO 220  K = 1,N1
      W = -VECTOR(I1-1)
      G = W
      CALL COMSCA(A(I1-1,I1),VECTOR(I1),G,K,DIM,1)
      VECTOR(I1-1) = -G / A(I1-1,I1-1)
  220 I1 = I1 - 1
  230 X = 0.
      DO 250  I = 1,N
```

```
58           ORDER = SIZE(VECTOR(I))                                  COMVEC    59
59           IF (X - ORDER) 240,250,250                               COMVEC    60
60       240 L = I                                                    COMVEC    61
61           X = ORDER                                                COMVEC    62
62       250 CONTINUE                                                 COMVEC    63
63           W = VECTOR(L)                                            COMVEC    64
64           DO 260  I = 1,N                                          COMVEC    65
65       260 VECTOR(I) = VECTOR(I) / W                                COMVEC    66
66           IF (KEY) 360,300,270                                     COMVEC    67
67       270 IF (X - BIG) 274,274,272                                 COMVEC    68
68       272 KEY = 0                                                  COMVEC    69
69           GO TO 276                                                COMVEC    70
70       274 KEY = KEY - 1                                            COMVEC    71
71           IF (KEY) 300,278,276                                     COMVEC    72
72       278 WRITE (ITAPEW,10) K, X, ROOT                             COMVEC    73
73       276 DO 290  I = 1,N1                                         COMVEC    74
74           IF (INTER(I)) 280,290,290                                COMVEC    75
75       280 INTER(I) = -INTER(I)                                     COMVEC    76
76           W = VECTOR(I)                                            COMVEC    77
77           VECTOR(I) = VECTOR(I+1)                                  COMVEC    78
78           VECTOR(I+1) = W                                          COMVEC    79
79       290 VECTOR(I+1) = VECTOR(I+1) - A(I+1,I)*VECTOR(I)           COMVEC    80
80           GO TO 200                                                COMVEC    81
81       300 K1 = N1                                                  COMVEC    82
82       310 IF (K1 .LT. 2) GO TO 330                                 COMVEC    83
83           G = VECTOR(K1+1)                                         COMVEC    84
84           CALL COMSCA(A(K1+1,1),VECTOR(2),G,K1-1,DIM,1)            COMVEC    85
85           VECTOR(K1+1) = G                                         COMVEC    86
86           K1 = K1 - 1                                              COMVEC    87
87           GO TO 310                                                COMVEC    88
88       330 K1 = N1                                                  COMVEC    89
89       340 W = VECTOR(K1)                                           COMVEC    90
90           IF (K1 .LT. 2) GO TO 350                                 COMVEC    91
91           L = INTER(K1-1)                                          COMVEC    92
92           VECTOR(K1) = VECTOR(L)                                   COMVEC    93
93           VECTOR(L) = W                                            COMVEC    94
94           K1 = K1 - 1                                              COMVEC    95
95           GO TO 340                                                COMVEC    96
96       350 KEY = -1                                                 COMVEC    97
97           GO TO 230                                                COMVEC    98
98     C                                                              COMVEC    99
99     C                                                              COMVEC   100
100    C FORMATS                                                      COMVEC   101
101    C                                                              COMVEC   102
102       10 FORMAT (1HO, 29HCOMVEC FAILURE.  K,X,ROOT = /,I3,1P3E20.8)  COMVEC   103
103    C                                                              COMVEC   104
104      360 RETURN                                                   COMVEC   105
105          END                                                      COMVEC   106
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
84	I	VECTOR	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  COMVEC          1           104

VARIABLES     SN  TYPE            RELOCATION
    O  A          COMPLEX     ARRAY     F.P.        REFS        3       24       28     2*29     2*30       35       36
                                                    2*38     2*40     2*43     2*44       48       53       54       79
                                                      84  DEFINED        1       24       28       36       37       39
                                                      41       43       45
  431  BIG        REAL                              REFS       67  DEFINED       20
  432  DELTA      REAL                              REFS       38       39       44       45  DEFINED       21
    O  DIM        INTEGER               F.P.        REFS        2        3       53       84  DEFINED        1
    O  EPS        REAL                  F.P.        REFS       20       21  DEFINED        1
  426  G          COMPLEX                           REFS       10       53       54       84       85
                                                 DEFINED       52       83
  435  I          INTEGER                           REFS       27     4*28     4*29     4*30     2*33       34       35
                                                    2*36       37     4*38     2*39     4*40     2*41       42     3*43
                                                    2*58       60     2*65       74     2*75       76     2*77       78
                                                    5*79  DEFINED       26       57       64       73
    O  INTER      INTEGER     ARRAY     F.P.        REFS        2       33       74       75       91
                                                 DEFINED        1       33       75
    O  ITAPES     INTEGER     ARRAY     CTAPES      REFS       12       13       17
  430  ITAPEW     INTEGER                        DEFINED       17 I/O REFS       72
  443  I1         INTEGER                           REFS       51     3*53     3*54       55  DEFINED       49       55
  440  J          INTEGER                           REFS       35     2*36       37     3*43  DEFINED       34       42
  444  K          INTEGER                           REFS       53       72  DEFINED       50
  442  KEY        INTEGER                           REFS       66       70       71  DEFINED       47       68       70
                                                      96
  446  K1         INTEGER                           REFS       82       83     2*84       85       86       89       90
                                                      91       92       94  DEFINED       81       86       88       94
  441  L          INTEGER                           REFS       63       92       93  DEFINED       46       60       91
    O  M          INTEGER               F.P.        REFS       22  DEFINED        1
  433  N          INTEGER                           REFS       23       34     4*44     2*45     4*48       49       57
                                                      64  DEFINED       22
  434  N1         INTEGER                           REFS       26       42       50       73       81       88
                                                 DEFINED       23
  445  ORDER      REAL                              REFS       59       61  DEFINED       58
    O  ROOT       COMPLEX               F.P.        REFS        3       24       28       72  DEFINED        1
    O  VECTOR     COMPLEX     ARRAY     F.P.        REFS        3       48       51       53     2*58       63       65
                                                      76       77     2*79       83       84       89       92
                                                 DEFINED        1       25       27       48       54       65       77
                                                      78       79       85       92       93
  424  W          COMPLEX                           REFS        3       37       41       43       52       65       78
                                                      93  DEFINED       35       40       51       63       76       89
  436  X          REAL                              REFS       31       59       67       72  DEFINED       29       32
                                                      56       61
  437  Y          REAL                              REFS       31       32  DEFINED       30
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS         REFERENCES
       COMSCA                  6                53       84

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       ABS          REAL       1  INTRIN               2*38     2*44     2*58
       AIMAG        REAL       1  INTRIN                 29       30       38       44       58
```

```
INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       CMPLX       COMPLEX    2  INTRIN               25        27        39        45
       REAL        REAL       1  INTRIN               29        30        38        44        58
       SIZE        REAL       1    SF        14       38        44        58

STATEMENT LABELS              DEF LINE    REFERENCES
  412   10       FMT            102         72
    0  100           INACTIVE    32         31
    0  110                       37         34
   64  120                       38         2*31
    0  130           INACTIVE    39         2*38
   75  140                       40         38
    0  150                       43         26        42
    0  160           INACTIVE    45         2*44
  140  170                       46         44
    0  190           INACTIVE    47
  142  200                       48         80
    0  220                       55         50
  210  230                       56         97
    0  240           INACTIVE    60         59
  224  250                       62         57        2*59
    0  260                       65         64
    0  270           INACTIVE    67         66
    0  272           INACTIVE    68         67
  257  274                       70         2*67
  263  276                       73         69        71
    0  278           INACTIVE    72         71
    0  280           INACTIVE    75         74
  302  290                       79         73        2*74
  313  300                       81         66        71
  315  310                       82         87
  337  330                       88         82
  341  340                       89         95
  360  350                       96         90
  362  360                      104         66

LOOPS  LABEL    INDEX      FROM-TO     LENGTH     PROPERTIES
   27  150      I           26 43        77B                NOT INNER
   56  110      J           34 37         5B       INSTACK
  114  150      J           42 43         7B       INSTACK
  157  220      K           50 55        31B                EXT REFS
  216  250      I           57 62        10B          OPT
  242  260      I           64 65         7B       INSTACK
  273  290      I           73 79        16B          OPT

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTAPES        50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 470B      312
  CM LABELED COMMON LENGTH        62B       50
          52000B CM USED
```

```
      SUBROUTINE GGCHK (NQ,RQ,VEC,RORT,QUO,VINFV,GR,GC,ICLUE,NOD,Q,TOL,   GGCHK
     1                  MMOD)                                             GGCHK
C                                                                         GGCHK
      DIMENSION TILDA (40,40), VINF(40,40), GR(1), GC(1)                  GGCHK
C                                                                         GGCHK
      COMPLEX RQ(MMOD,1), VEC(MMOD,1), RORT(1), VINFV(MMOD,1), Z(40)      GGCHK
C                                                                         GGCHK
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       GGCHK
C     COMPLEX*16 COMSCA,VINF   ,TILDA ,SUM    ,DCMPLF                     GGCHK
C                                                                         GGCHK
C     DOUBLE PRECISION    SAM ,              RAD ,        DSCAPR          GGCHK
C     DOUBLE PRECISION     CAD                                            GGCHK
C     DOUBLE PRECISION ARG1,ARG2                                          GGCHK
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS          GGCHK
C                                                                         GGCHK
C                                                                         GGCHK
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       GGCHK
      COMPLEX COMSCA,VINF   ,TILDA ,SUM    ,DCMPLF                        GGCHK
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          GGCHK
C                                                                         GGCHK
      ARG1 = 0.0                                                          GGCHK
      ARG2 = 0.0                                                          GGCHK
      DO 1 I=1,NQ                                                         GGCHK
      DO 2 J=1,NQ                                                         GGCHK
      SUM = DCMPLF(ARG1,ARG2)                                             GGCHK
      TILDA(I,J) = VEC(I,J)                                               GGCHK
    2 VINF(I,J) = COMSCA (RQ(I,1),VEC(1,J),SUM,NQ,MMOD,1)                 GGCHK
    1 CONTINUE                                                            GGCHK
C     ---- VEC(INVERSE) X Q X VEC = ROOTS    -----------------------      GGCHK
      CALL CLINEQ (TILDA,VINF,NQ,NQ,MMOD,NOD)                             GGCHK
      DO 10 I = 1,NQ                                                      GGCHK
      DO 10 J = 1,NQ                                                      GGCHK
   10 VINFV(I,J) = VINF(I,J)                                              GGCHK
      SAM = 0.0                                                           GGCHK
      NQ2=2*NQ                                                            GGCHK
      BOTTOM = DSQRTF(DSCAPR(RORT,RORT,SAM,NQ2,1,1))                      GGCHK
      DO 3 I=1,NQ                                                         GGCHK
      VINFV(I,I)=VINFV(I,I)-RORT(I)                                       GGCHK
    3 Z(I)=VINFV(I,I)                                                     GGCHK
      SAM = 0.0                                                           GGCHK
      DO 4 I=1,NQ                                                         GGCHK
    4 SAM = DSCAPR(VINFV(1,I),VINFV(1,I),SAM,NQ2,1,1)                     GGCHK
      TOP = DSQRTF(SAM)                                                   GGCHK
      QUO = TOP /BOTTOM                                                   GGCHK
      DO 5 I=1,NQ                                                         GGCHK
      VINFV(I,I)=VINFV(I,I)+RORT(I)                                       GGCHK
      RAD = 0.0                                                           GGCHK
      CAD = 0.0                                                           GGCHK
      DO 6 J=1,NQ                                                         GGCHK
      IF(I.EQ.J)GO TO 6                                                   GGCHK
      SAM = 0.0                                                           GGCHK
      RAD = RAD + DSQRTF(DSCAPR(VINFV(I,J),VINFV(I,J),SAM,2,1,1))         GGCHK
      SAM = 0.0                                                           GGCHK
      CAD = CAD + DSQRTF(DSCAPR(VINFV(J,I),VINFV(J,I),SAM,2,1,1))         GGCHK
    6 CONTINUE                                                            GGCHK
      GC(I)=CAD                                                           GGCHK
    5 GR(I)=RAD                                                           GGCHK
```

```
                   ICLUE=O                                                          GGCHK      59
                   DO 7 I=1,NQ                                                      GGCHK      60
 60                ZR1=REAL(VINFV(I,I))                                             GGCHK      61
                   ZI1=AIMAG(VINFV(I,I))                                            GGCHK      62
                   ZRI1 = CABS(VINFV(I,I))                                          GGCHK      63
                   DO 8 J=1,NQ                                                      GGCHK      64
                   IF(J.LE.I)GO TO 8                                                GGCHK      65
 65                ZR2=REAL(VINFV(J,J))                                             GGCHK      66
                   ZI2=AIMAG(VINFV(J,J))                                            GGCHK      67
                   ZRI2 = CABS(VINFV(J,J))                                          GGCHK      68
                   IF (ZRI1.LE.TOL.AND.ZRI2.LE.TOL) GO TO 8                         GGCHK      69
                   DIFR=ABS(ZR1-ZR2)                                                GGCHK      70
 70                DIFI=ABS(ZI1-ZI2)                                                GGCHK      71
                   DIF=SQRT(DIFR**2+DIFI**2)                                        GGCHK      72
                   RM=GR(I)+GR(J)                                                   GGCHK      73
                   CM=GC(I)+GC(J)                                                   GGCHK      74
                   RCM  =  AMIN1(RM,CM)                                             GGCHK      75
 75                IF (DIF.LE.RCM) ICLUE = ICLUE + 1                                GGCHK      76
                 8 CONTINUE                                                         GGCHK      77
                 7 CONTINUE                                                         GGCHK      78
                   RETURN                                                           GGCHK      79
                   END                                                              GGCHK      80
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  GGCHK          1            78

VARIABLES      SN  TYPE            RELOCATION
  346  ARG1        REAL                            REFS        25   DEFINED      21
  347  ARG2        REAL                            REFS        25   DEFINED      22
  354  BOTTOM      REAL                            REFS        44   DEFINED      36
  357  CAD         REAL                            REFS        54        56   DEFINED      48      54
  372  CM          REAL                            REFS        74   DEFINED      73
  370  DIF         REAL                            REFS        75   DEFINED      71
  367  DIFI        REAL                            REFS        71   DEFINED      70
  366  DIFR        REAL                            REFS        71   DEFINED      69
    O  GC          REAL       ARRAY     F.P.       REFS         4      2*73   DEFINED       1      56
    O  GR          REAL       ARRAY     F.P.       REFS         4      2*72   DEFINED       1      57
  350  I           INTEGER                         REFS      2*26      2*27      2*33    5*38    3*39    2*42    5*46
                                                     50      2*52      2*54        56      57    2*60    2*61    2*62
                                                     64        72        73   DEFINED      23      31      37      41
                                                     45        59
    O  ICLUE       INTEGER              F.P.       REFS        75   DEFINED         1      58      75
  351  J           INTEGER                         REFS      2*26      2*27      2*33      50    2*52    2*54      64
                                                   2*65      2*66      2*67        72      73  DEFINED     24      32
                                                     49        63
    O  MMOD        INTEGER              F.P.       REFS       3*6        27        30  DEFINED       1
    O  NOD         INTEGER              F.P.       REFS        30   DEFINED         1
    O  NQ          INTEGER              F.P.       REFS        23        24        27    2*30      31      32      35
                                                     37        41        45        49      59      63
                                                DEFINED         1
  353  NQ2         INTEGER                         REFS        36        42   DEFINED      35
```

```
VARIABLES      SN  TYPE            RELOCATION
    O  Q           REAL      *UNUSED    F.P.      DEFINED      1
    O  QUO         REAL                 F.P.      DEFINED      1        44
  356  RAD         REAL                              REFS     52        57   DEFINED        47        52
  373  RCM         REAL                              REFS     75   DEFINED        74
  371  RM          REAL                              REFS     74   DEFINED        72
    O  RORT        COMPLEX   ARRAY      F.P.         REFS      6      2*36        38        46   DEFINED         1
    O  RQ          COMPLEX   ARRAY      F.P.         REFS      6        27   DEFINED         1
  352  SAM         REAL                              REFS     36        42        43        52        54
                                                  DEFINED     34        40        42        51        53
  344  SUM         COMPLEX                           REFS     18        27   DEFINED        25
  374  TILDA       COMPLEX   ARRAY                   REFS      4        18        30   DEFINED        26
    O  TOL         REAL                 F.P.         REFS   2*68   DEFINED         1
  355  TOP         REAL                              REFS     44   DEFINED        43
    O  VEC         COMPLEX   ARRAY      F.P.         REFS      6        26        27   DEFINED         1
 6574  VINF        COMPLEX   ARRAY                   REFS      4        18        30        33   DEFINED        27
    O  VINFV       COMPLEX   ARRAY      F.P.         REFS      6        38        39      2*42        46      2*52      2*54
                                                       60     61        62        65        66        67
                                                  DEFINED      1        33        38        46
14774  Z           COMPLEX   ARRAY                   REFS      6   DEFINED        39
  361  ZI1         REAL                              REFS     70   DEFINED        61
  364  ZI2         REAL                              REFS     70   DEFINED        66
  362  ZRI1        REAL                              REFS     68   DEFINED        62
  365  ZRI2        REAL                              REFS     68   DEFINED        67
  360  ZR1         REAL                              REFS     69   DEFINED        60
  363  ZR2         REAL                              REFS     69   DEFINED        65

EXTERNALS          TYPE    ARGS        REFERENCES
       CABS        REAL      1 LIBRARY     62        67
       CLINEO                6             30
       COMSCA      COMPLEX   6             18        27
       DCMPLF      COMPLEX   2             18        25
       DSCAPR      REAL      6             36        42        52        54
       DSQRTF      REAL      1             36        43        52        54
       SQRT        REAL      1 LIBRARY     71

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       ABS         REAL      1  INTRIN               69        70
       AIMAG       REAL      1  INTRIN               61        66
       AMIN1       REAL      O  INTRIN               74
       REAL        REAL      1  INTRIN               60        65

STATEMENT LABELS              DEF LINE   REFERENCES
    O  1                          28         23
    O  2                          27         24
    O  3                          39         37
    O  4                          42         41
    O  5                          57         45
  200  6                          55         49        50
    O  7                          77         59
  260  8                          76         63        64        68
    O  10                         33         31        32

LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
   13  1         I          23 28        31B               EXT REFS  NOT INNER
   14  2         J          24 27        .3B               EXT REFS
   53  10        I          31 33        17B               NOT INNER
   63  10        J          32 33         3B        INSTACK
```

```
VARIABLES      SN  TYPE            RELOCATION
     3  LINEST     INTEGER              CLIST          REFS          24    DEFINED      40       184
   536  MID        INTEGER                             REFS          59      173    DEFINED      39
    26  MORBAL     INTEGER              KLUES          REFS          21
     5  MSADD      INTEGER              KLUES          REFS          21
   540  MTAP2      INTEGER                          DEFINED          56    I/O REFS     65        75        92        93
    13  NBAR       INTEGER              KLUES          REFS          21
     3  NCOLS      INTEGER              CTABLE         REFS          26    DEFINED     103       118       135       150       167
     4  NCOLST     INTEGER              CTABLE         REFS          26
    20  NCYC       INTEGER              KLUES          REFS          21
    14  NFIX       INTEGER              KLUES          REFS          21
    21  NNN        INTEGER              KLUES          REFS          21
     6  NPAGE      INTEGER              CLIST          REFS          24
     6  NPAGEA     INTEGER              CTABLE         REFS          26
     6  NPAS       INTEGER              KLUES          REFS          21
     1  NPASS      INTEGER              CTABLE         REFS          26
   543  NPTS       INTEGER                             REFS         108      123       140       155       181
                                                    DEFINED          63
     5  NQZ        INTEGER              FLUTV          REFS          19       61        63        75        76        89
     2  NROWS      INTEGER              CTABLE         REFS          26    DEFINED     104       119       136       151       168
    57  NRVBO      INTEGER              FLUTAN         REFS          18
 50006  NSYM       INTEGER    ARRAY                    REFS           8      108       123       140       155       174       176
                                                        177         181    DEFINED      60        61
   541  NVBO       INTEGER                             REFS          61       63        74        77    DEFINED       57        58
     6  NVTOT      INTEGER              FLUTV          REFS          19       57        90        91
 50136  RELLOC     REAL       ARRAY                    REFS          10      181    DEFINED      33
     0  RHO        REAL      *UNUSED     F.P.       DEFINED           1
    40  RVBO       REAL       ARRAY     FLUTAN         REFS           5       18
     2  VBO        REAL       ARRAY     FLUTAN         REFS           5       18
    10  VDES       REAL                 KLUES          REFS          21
   556  VEQ        REAL       ARRAY                    REFS           7      108       123       140       155
                                                    DEFINED          80       92
     1  VH         REAL                 FLUTV          REFS          19
     0  VL         REAL                 FLUTV          REFS          19
     4  VMAX       REAL                 PRPL           REFS          17      108       123       140       155
     5  VMIN       REAL                 PRPL           REFS          17      108       123       140       155
 50072  VNAME1     REAL       ARRAY                    REFS           9      108       123    DEFINED       30
 50106  VNAME2     REAL       ARRAY                    REFS           9      140       155    DEFINED       31
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
        PICTUR               14             108       123       140       155       181
        PTABLE                3             106       121       138       153       170
        TITLES                1             100       115       132       147       164

STATEMENT LABELS              DEF LINE    REFERENCES
     0  1                        62           59
   247  7                       180          173       174
   235  8                       177          175
     0  9                       179          178
    70  10                       89           73
     0  15                       81           74        76
     0  20                       92           89
   155  100                     130           98
   211  200                     161          125
   115  500                      93           82
   253  1000                    183          162
   455  1610     FMT            190          133
```

```
VARIABLES     SN  TYPE            RELOCATION
    0  DUMD1      REAL       ARRAY    PRPL        REFS        12       14
   12  DWMAX      REAL                KLUES       REFS        21
   11  EPS1       REAL                KLUES       REFS        21
   17  EPS2       REAL                KLUES       REFS        21
    3  FHI        REAL                FLUTV       REFS        19
    2  FLO        REAL                FLUTV       REFS        19
    0  FMACH      REAL                FLUTAN      REFS        18
    2  FRMAX      REAL                PRPL        REFS        17      123       155
    3  FRMIN      REAL                PRPL        REFS        17      123       155
50056  FRNAME     REAL       ARRAY                REFS         9      123       155     DEFINED      29
10416  GD         REAL       ARRAY                REFS         7      108       140       179     DEFINED      79        92
37756  GDD        REAL       ARRAY                REFS         7      181     DEFINED     179
50122  GDNAME     REAL       ARRAY                REFS        10      108       140     DEFINED      32
    0  GMAX       REAL                PRPL        REFS        14       17       108       140
    1  GMIN       REAL                PRPL        REFS        17      108       140
  542  I          INTEGER                         REFS        60     2*61        75      3*92       174       175       176
                                                   177    DEFINED      59        75        92       173
30116  IAUX       INTEGER    ARRAY                REFS         7      108       123       140       155       181
   22  IBAND      INTEGER             KLUES       REFS        21
  554  IBEGIN     INTEGER                         REFS       176      177       178     DEFINED     172       176
    7  IDNOPT     INTEGER             KLUES       REFS        21
    4  IE         INTEGER             FLUTV       REFS        19
  555  IEND       INTEGER                         REFS       178    DEFINED     177
   23  IFIN       INTEGER             KLUES       REFS        21
  551  IM         INTEGER                         REFS        90       91     DEFINED      89
  550  INDX       INTEGER                         REFS        78       79        80     DEFINED      77
  544  IPLOT      INTEGER                         REFS        98    DEFINED      64
    2  IRED       INTEGER             KLUES       REFS        21
    0  ISAVFO     INTEGER   *UNUSED    F.P.     DEFINED        1
    0  ITAPES     INTEGER    ARRAY    CTAPES      REFS        11       20        55        56
    7  ITAPET     INTEGER             CTABLE      REFS        26
  537  ITAPEW     INTEGER                       DEFINED       55    I/O REFS     101       116       133       148       165
  545  IV         INTEGER                         REFS        77    DEFINED      74
  547  IZ         INTEGER                         REFS        77       78        79        80     DEFINED      76
  546  J          INTEGER                         REFS        75    3*179     DEFINED      75       178
  552  J1         INTEGER                         REFS        92    DEFINED      90
  553  J2         INTEGER                         REFS        92    DEFINED      91
    7  KBPAGE     INTEGER             CLIST       REFS        24
    4  KLABEL     INTEGER             CLIST       REFS        24
   24  KLUB       INTEGER             KLUES       REFS        21
    4  KLUBAL     INTEGER             KLUES       REFS        21
    3  KLUMD      INTEGER             KLUES       REFS        21
    1  KLUNAL     INTEGER             KLUES       REFS        21
   25  KLUQ       INTEGER             KLUES       REFS        21
    0  KLUSE      INTEGER             KLUES       REFS        21
    0  KOUNT      INTEGER             CLIST       REFS        24      102       117       134       149       166
                                                DEFINED       99      102       114       117       131       134       146
                                                   149       163      166       185
   11  KOUNTH     INTEGER             CLIST       REFS        24
   12  KOUNTI     INTEGER             CLIST       REFS        24
    1  KPAGE      INTEGER             CLIST       REFS        24
    0  KTABLE     INTEGER             CTABLE      REFS        26    DEFINED     105       120       137       152       169
    5  KTABLO     INTEGER             CTABLE      REFS        26
    5  KTPAGE     INTEGER             CLIST       REFS        24
    0  LC         INTEGER    ARRAY    COMA        REFS         6       16        57      2*58        64        73       162
    2  LINES      INTEGER             CLIST       REFS        24       99       114       131       146       163       185
   10  LINESG     INTEGER             CLIST       REFS        24
```

```
          IBEGIN    =  1                                                   PRPLT     173
          DO 7 I=1,MID                                                     PRPLT     174
          IF( NSYM(I) .EQ. O )           GO TO 7                           PRPLT     175
          IF ( I  .EQ.  1 )              GO TO 8                           PRPLT     176
          IBEGIN    =   IBEGIN + NSYM(I-1)                                 PRPLT     177
        8 IEND      =   IBEGIN + NSYM(I) - 1                               PRPLT     178
          DO 9  J = IBEGIN , IEND                                          PRPLT     179
        9 GDD(J)    =   GD(J) * CPS(J)                                     PRPLT     180
        7 CONTINUE                                                         PRPLT     181
          CALL PICTUR (CPS,GDD,NPTS,AIMLOC,RELLOC,100.0,1.0,2.0,50.0,2.0,1.0 PRPLT     182
         1             ,NSYM,1,IAUX)                                       PRPLT     183
     1000 CONTINUE                                                         PRPLT     184
          LINEST =  4                                                      PRPLT     185
          KOUNT  =  LINES                                                  PRPLT     186
C                                                                          PRPLT     187
C                                                                          PRPLT     188
C FORMATS                                                                  PRPLT     189
C                                                                          PRPLT     190
 1610 FORMAT (10X,41                                                       PRPLT     191
     1   HPRINT-PLOT OF DAMPING VS VELOCITY (TRUE )                        PRPLT     192
     2      ,/10X,41(1H-))                                                 PRPLT     193
 1620 FORMAT (10X,43                                                       PRPLT     194
     1   HPRINT-PLOT OF FREQUENCY VS VELOCITY (TRUE )                      PRPLT     195
     2      ,/10X,43(1H-))                                                 PRPLT     196
 1660 FORMAT (10X,41                                                       PRPLT     197
     1   HPRINT-PLOT OF DAMPING VS VELOCITY (EQUIV)                        PRPLT     198
     2      ,/10X,41(1H-))                                                 PRPLT     199
 1670 FORMAT (10X,43                                                       PRPLT     200
     1   HPRINT-PLOT OF FREQUENCY VS VELOCITY (EQUIV)                      PRPLT     201
     2      ,/10X,43(1H-))                                                 PRPLT     202
 1680 FORMAT (10X,44                                                       PRPLT     203
     1   HPRINT-PLOT OF ROOT LOCUS OF FLUTTER SOLUTION                     PRPLT     204
     2      ,/10X,44(1H-))                                                 PRPLT     205
C                                                                          PRPLT     206
          RETURN                                                           PRPLT     207
          END                                                              PRPLT     208
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	PRPLT	1	206

VARIABLES		SN TYPE	RELOCATION								
47616	A	REAL	ARRAY		REFS	8	78	79	80	DEFINED	75
0	ACH	REAL	*UNUSED	F.P.	DEFINED	1					
50152	AIMLOC	REAL	ARRAY		REFS	10	181	DEFINED	34		
1	BETA	REAL		FLUTAN	REFS	18					
50	BR	REAL		COMA	REFS	16					
20256	CPS	REAL	ARRAY		REFS	7	123	155	179	181	
					DEFINED	78	92				
15	D	REAL		KLUES	REFS	21					
27	DBAL	REAL		KLUES	REFS	21					
16	DEL	REAL		KLUES	REFS	21					

```
      CALL TITLES (-1)                                                 PRPLT     116
      WRITE (ITAPEW,1670)                                              PRPLT     117
      KOUNT  =  KOUNT + 2                                              PRPLT     118
      NCOLS  =  4                                                      PRPLT     119
      NROWS  =  0                                                      PRPLT     120
      KTABLE =  2                                                      PRPLT     121
      CALL PTABLE (2,43,43                                             PRPLT     122
     1   HPRINT-PLOT OF FREQUENCY VS VELOCITY (EQUIV))                 PRPLT     123
      CALL PICTUR (CPS,VEQ,NPTS,FRNAME,VNAME1,-100.0,VMIN,VMAX,-50.0,  PRPLT     124
     1FRMAX,FRMIN,NSYM,1,IAUX)                                         PRPLT     125
      GO TO 200                                                        PRPLT     126
C                                                                      PRPLT     127
C                                                                      PRPLT     128
C PRINT PLOT OF DAMPING VERSUS VELOCITY (TRUE)                         PRPLT     129
C                                                                      PRPLT     130
  100 CONTINUE                                                         PRPLT     131
      KOUNT  =  LINES                                                  PRPLT     132
      CALL TITLES (-1)                                                 PRPLT     133
      WRITE (ITAPEW,1610)                                              PRPLT     134
      KOUNT  =  KOUNT + 2                                              PRPLT     135
      NCOLS  =  4                                                      PRPLT     136
      NROWS  =  0                                                      PRPLT     137
      KTABLE =  2                                                      PRPLT     138
      CALL PTABLE (2,41,41                                             PRPLT     139
     1   HPRINT-PLOT OF DAMPING VS VELOCITY (TRUE ))                   PRPLT     140
      CALL PICTUR (GD,VEQ,NPTS,GDNAME,VNAME2,-100.0,VMIN,VMAX,-50.0,GMAX PRPLT   141
     1,GMIN,NSYM,1,IAUX)                                               PRPLT     142
C                                                                      PRPLT     143
C                                                                      PRPLT     144
C PRINT PLOT OF FREQUENCY VERSUS VELOCITY (TRUE)                       PRPLT     145
C                                                                      PRPLT     146
      KOUNT  =  LINES                                                  PRPLT     147
      CALL TITLES (-1)                                                 PRPLT     148
      WRITE (ITAPEW,1620)                                              PRPLT     149
      KOUNT  =  KOUNT + 2                                              PRPLT     150
      NCOLS  =  4                                                      PRPLT     151
      NROWS  =  0                                                      PRPLT     152
      KTABLE =  2                                                      PRPLT     153
      CALL PTABLE (2,43,43                                             PRPLT     154
     1   HPRINT-PLOT OF FREQUENCY VS VELOCITY (TRUE ))                 PRPLT     155
      CALL PICTUR (CPS,VEQ,NPTS,FRNAME,VNAME2,-100.0,VMIN,VMAX,-50.0,  PRPLT     156
     1FRMAX,FRMIN,NSYM,1,IAUX)                                         PRPLT     157
C                                                                      PRPLT     158
C                                                                      PRPLT     159
C PRINT PLOT OF ROOT LOCUS OF FLUTTER SOLOTION (FREQUENCY VS DAMPING)  PRPLT     160
C                                                                      PRPLT     161
  200 CONTINUE                                                         PRPLT     162
      IF (LC(1) .NE. -1) GO TO 1000                                    PRPLT     163
      KOUNT  =  LINES                                                  PRPLT     164
      CALL TITLES (-1)                                                 PRPLT     165
      WRITE (ITAPEW,1680)                                              PRPLT     166
      KOUNT  =  KOUNT + 2                                              PRPLT     167
      NCOLS  =  4                                                      PRPLT     168
      NROWS  =  0                                                      PRPLT     169
      KTABLE =  2                                                      PRPLT     170
      CALL PTABLE (2,44,44                                             PRPLT     171
     1   HPRINT-PLOT OF ROOT LOCUS OF FLUTTER SOLUTION)                PRPLT     172
```

```
      IF (LC(1).NE.-1)  NVBO = LC(4)
      DO 1 I=1,MID
      NSYM (I) = O
      IF (I .LE. NQZ) NSYM(I) = NVBO
    1 CONTINUE
      NPTS  =  NVBO * NQZ
      IPLOT = LC(15)
      REWIND MTAP2
C
C
C READ DATA FROM UNIT MTAP2 AND PLOT FOR
C   1.  PRESSURE CALCULATIONS  (LCC1) = 0)
C   2.  K - FLUTTER ANALYSIS   (CL(1) = 1)
C   3.  DIVERGENCE ANALYSIS    (LC(1) = 2)
C
      IF (LC(1).EQ.-1) GOTO 10
      DO 15 IV=1,NVBO
      READ (MTAP2) ((A(I,J), I=1,3), J=1,NQZ)
      DO 15 IZ=1,NQZ
      INDX = (IZ-1)*NVBO + IV
      CPS(INDX) = A(1,IZ)
      GD (INDX) = A(2,IZ)
      VEQ(INDX) = A(3,IZ)
   15 CONTINUE
      GOTO 500
C
C
C READ DATA FROM UNIT MTAP2 AND PLOT FOR
C   1.  P - K FLUTTER ANALYSIS AND/OR  (LC(1) = -1)
C   2.  FLUTTER REDESIGN               (LC(1) = -1)
C
   10 DO 20 IM=1,NQZ
      J1 = (IM-1)*NVTOT + 1
      J2 = IM* NVTOT
   20 READ(MTAP2)  (CPS(I), GD(I), VEQ(I), I=J1,J2)
  500 REWIND MTAP2
C
C
C PRINT PLOT OF DAMPING VERSUS VELOCITY (EQUIVALENT)
C
      IF (IPLOT.NE.0) GO TO 100
      KOUNT  =  LINES
      CALL TITLES (-1)
      WRITE (ITAPEW,1660)
      KOUNT  =  KOUNT + 2
      NCOLS  =  4
      NROWS  =  0
      KTABLE =  2
      CALL PTABLE (2,41,41
     1   HPRINT-PLOT OF DAMPING VS VELOCITY (EQUIV))
      CALL PICTUR (GD,VEQ,NPTS,GDNAME,VNAME1,-100.0,VMIN,VMAX,-50.0,GMAX
     1,GMIN,NSYM,1,IAUX)
C
C
C PRINT PLOT OF FREQUENCY VERSUS VELOCITY (EQUIVALENT)
C
      KOUNT  =  LINES
```

```
      SUBROUTINE PRPLT (ACH, RHO, ISAVFO)                                PRPLT      2
C                                                                        PRPLT      3
C     ROUTINE FOR PRINT-PLOT DISPLAY OF FLUTTER SOLUTION                 PRPLT      4
C                                                                        PRPLT      5
      DIMENSION VBO(30), RVBO(15)                                        PRPLT      6
      DIMENSION          LC(40)                                          PRPLT      7
      DIMENSION VEQ(4000), GD(4000), CPS(4000), IAUX(4000), GDD(4000)    PRPLT      8
      DIMENSION A(3,40), NSYM(40)                                        PRPLT      9
      DIMENSION     FRNAME(12) ,   VNAME1(12) ,    VNAME2(12)            PRPLT     10
      DIMENSION     GDNAME(12) ,   RELLOC(12) ,    AIMLOC(12)            PRPLT     11
      DIMENSION ITAPES(50)                                               PRPLT     12
      DIMENSION DUMD1(1)                                                 PRPLT     13
C                                                                        PRPLT     14
      EQUIVALENCE (GMAX,DUMD1(1))                                        PRPLT     15
C                                                                        PRPLT     16
      COMMON /COMA  / LC, BR                                             PRPLT     17
      COMMON /PRPL  / GMAX,GMIN,FRMAX,FRMIN,VMAX,VMIN                    PRPLT     18
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                  PRPLT     19
      COMMON /FLUTV / VL,VH,FLO,FHI,IE,NQZ,NVTOT                         PRPLT     20
      COMMON / CTAPES / ITAPES                                           PRPLT     21
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT,   PRPLT     22
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, PRPLT     23
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                           PRPLT     24
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    PRPLT     25
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        PRPLT     26
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA   PRPLT     27
     1               ,ITAPET                                             PRPLT     28
C                                                                        PRPLT     29
      DATA    FRNAME/1H ,1H ,1HF,1HR,1HE,1HQ,1H-,1HC,1HP,1HS,1H ,1H /    PRPLT     30
      DATA    VNAME1/1HV,1HE,1HL,1H(,1HE,1HQ,1H),1H-,1HK,1HT,1HS,1H /    PRPLT     31
      DATA    VNAME2/1HV,1HE,1HL,1H(,1HT,1HR,1H),1H-,1HK,1HT,1HS,1H /    PRPLT     32
      DATA    GDNAME/1H ,1HD,1HA,1HM,1HP,1HI,1HN,1HG,1H-,1HG,1H ,1H /    PRPLT     33
      DATA    RELLOC/1HR,1HE,1HA,1HL,1H ,1H(,1HD,1HA,1HM,1HP,1H),1H /    PRPLT     34
      DATA    AIMLOC/1HI,1HM,1HA,1HG,1H ,1H(,1HF,1HR,1HE,1HQ,1H),1H /    PRPLT     35
C                                                                        PRPLT     36
C                                                                        PRPLT     37
C INITIAL CONDITIONS                                                     PRPLT     38
C                                                                        PRPLT     39
      MID = 40                                                           PRPLT     40
      LINEST =  1                                                        PRPLT     41
C  ******************************************************                PRPLT     42
C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE       *               PRPLT     43
C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT       *               PRPLT     44
C  *       USED IN THE CURRENT VERSION OF ESP.           *               PRPLT     45
C  ******************************************************                PRPLT     46
C     IF (KLUSE .EQ. 0)  GO TO 12                                        PRPLT     47
C     IF (NCYC .GT. 0 )  GO TO 11                                        PRPLT     48
C     WRITE (ISAVFO)  (DUMD1(I),I=1,6)                                   PRPLT     49
C     GO TO 12                                                           PRPLT     50
C  11 READ (ISAVFO)  (DUMD1(I),I=1,6)                                    PRPLT     51
C  12 CONTINUE                                                           PRPLT     52
C  ******************************************************                PRPLT     53
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.      *               PRPLT     54
C  ******************************************************                PRPLT     55
      ITAPEW = ITAPES(6)                                                 PRPLT     56
      MTAP2  =  ITAPES(22)                                               PRPLT     57
      IF (LC(1).EQ.-1) NVBO = NVTOT                                      PRPLT     58
```

```
LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
  172  12       I          69 78        16B        OPT

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMA         41                 0 LC      (40)             40 CR      (1)

STATISTICS
  PROGRAM LENGTH                1023B     531
  CM LABELED COMMON LENGTH        51B      41
          52000B CM USED
```

```
VARIABLES       SN  TYPE            RELOCATION
  236  L            INTEGER                              REFS      2*64  DEFINED      63
    0  LC           INTEGER     ARRAY     COMA           REFS         6       11      13
    0  NIV          INTEGER               F.P.           REFS        46       51      65       75  DEFINED       1
    0  NQ           INTEGER               F.P.           REFS        15       24      56       57       63      69
                                                       DEFINED        1
    0  OMGR         REAL                  F.P.           REFS        27       44  DEFINED       1
  237  REQ          REAL        ARRAY                    REFS         4       76  DEFINED      66
    0  RHQ          REAL                  F.P.           REFS        50  DEFINED       1
    0  ROBT         COMPLEX     ARRAY     F.P.           REFS         9  DEFINED       1       74
    0  ROOT         COMPLEX     ARRAY     F.P.           REFS         9       16      21       22       25      30      62
                                                       DEFINED        1       18      23
  617  ROPT         COMPLEX     ARRAY                    REFS         9       74  DEFINED      62
  231  RTIM         REAL                                 REFS        23  DEFINED      22
  230  RTRE         REAL                                 REFS        23  DEFINED      21
  233  TESTR        REAL                                 REFS        28  DEFINED      27
    0  VBR          REAL                  F.P.           REFS        47  DEFINED       1
    0  VEC          COMPLEX     ARRAY     F.P.           REFS         9       64  DEFINED       1
    0  VECT         COMPLEX     ARRAY     F.P.           REFS         9  DEFINED       1       64
    0  VFLSP        REAL        ARRAY     F.P.           REFS         7       59  DEFINED       1       36      42      50
                                                         70
  307  VLSP         REAL        ARRAY                    REFS         4       70  DEFINED      59
  427  ZFLSP        REAL        ARRAY                    REFS         4       73  DEFINED      61
  357  ZFREQ        REAL        ARRAY                    REFS         4       71  DEFINED      60
  234  ZI           REAL                                 REFS        40       52  DEFINED      30
  232  ZR           REAL                                 REFS        26       27      31       44       52
                                                       DEFINED       25       28

EXTERNALS           TYPE     ARGS        REFERENCES
       AORDER                  4              56
       CABS         REAL       1 LIBRARY      16
       SQRT         REAL       1 LIBRARY      27       44       50

INLINE FUNCTIONS    TYPE     ARGS         DEF LINE   REFERENCES
       AIMAG        REAL       1  INTRIN                22       30
       CMPLX        COMPLEX    2  INTRIN                18       23
       REAL         REAL       1  INTRIN                21       25

STATEMENT LABELS              DEF LINE   REFERENCES
   33  2                          24         14
   25  3                          23         15       19
  114  4                          55         24       37       43       51
    0  5            INACTIVE      32         31
   55  6                          38         31
   63  7                          44         31
   76  9                          49         46
  101  10                         50         48
  157  11                         68         57       65
  206  12                         78         69       75
   45  20                         29         26
    0  40                         64         63
   21  50                         20         17

LOOPS  LABEL     INDEX      FROM-TO    LENGTH    PROPERTIES
   12  3         I           15 23       21B              EXT REFS
   34  4         I           24 55       63B              EXT REFS
  124  11        I           57 68       36B              NOT INNER
  147  40        L           63 64        3B      INSTACK
```

```
      J=IPERM(I)                                            TRFR      59
      VLSP(I)=VFLSP(J)                                      TRFR      60
      ZFREQ(I)=FREQ(J)                                      TRFR      61
      ZFLSP(I)=FLSP(J)                                      TRFR      62
      ROPT(I)=ROOT(J)                                       TRFR      63
      DO 40 L = 1,NQ                                        TRFR      64
   40 VECT(L,I) = VEC(L,J)                                  TRFR      65
      IF(NIV.NE.O)GO TO 11                                  TRFR      66
      REQ(I)=CFREQ(J)                                       TRFR      67
      AMP(I)=DAMP(J)                                        TRFR      68
   11 CONTINUE                                              TRFR      69
      DO 12 I=1,NQ                                          TRFR      70
      VFLSP(I)=VLSP(I)                                      TRFR      71
      FREQ(I)=ZFREQ(I)                                      TRFR      72
      IF(FREQ(I).EQ.1.OE+45)FREQ(I)=-O.O                    TRFR      73
      FLSP(I)=ZFLSP(I)                                      TRFR      74
      ROBT(I)=ROPT(I)                                       TRFR      75
      IF(NIV.NE.O)GO TO 12                                  TRFR      76
      CFREQ(I)=REQ(I)                                       TRFR      77
      DAMP(I)=AMP(I)                                        TRFR      78
   12 CONTINUE                                              TRFR      79
      RETURN                                                TRFR      80
      END                                                   TRFR      81
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  TRFR          1          79

VARIABLES      SN  TYPE            RELOCATION
  547  AMP         REAL      ARRAY               REFS        5       77  DEFINED       67
    O  BR          REAL                F.P.      REFS       47  DEFINED        1
    O  CFREQ       REAL      ARRAY     F.P.      REFS        7       66  DEFINED        1       35       41       54
                                                   76
   50  CR          REAL                COMA      REFS       11
    O  DAMP        REAL      ARRAY     F.P.      REFS        7       67  DEFINED        1       34       40       52
                                                   53       77
  227  DENOM       REAL                          REFS       17       21       22  DEFINED       16
    O  FLSP        REAL      ARRAY     F.P.      REFS        7       50       61  DEFINED        1       33       39
                                                   47       49       73
    O  FREQ        REAL      ARRAY     F.P.      REFS        7       45       47       49       53       54       56
                                                   60       72  DEFINED        1       32       38       44       45
                                                   71       72
  226  I           INTEGER                       REFS       16       18       21       22       23       25       30
                                                   32       33       34       35       36       38       39       40
                                                   41       42       44     2*45     2*47     2*49     2*50       52
                                                 2*53     2*54       58       59       60       61       62       64
                                                   66       67     2*70     2*71     2*72     2*73     2*74     2*76
                                                 2*77  DEFINED       15       24       57       69
  477  IPERM       INTEGER   ARRAY               REFS        5       56       58
    O  ITCH3       INTEGER             F.P.      REFS       14  DEFINED        1       13
  235  J           INTEGER                       REFS       59       60       61       62       64       66       67
                                              DEFINED       58
```

```
      SUBROUTINE TRFR(ROOT,ITCH3,NIV,FREQ,FLSP,DAMP,CFREQ,VFLSP,NQ,BR,
     1                ROBT,OMGR,RHQ,VBR,VECT,VEC)
C
      DIMENSION REQ(40), VLSP(40), ZFREQ(40), ZFLSP(40)
      DIMENSION IPERM(40), AMP(40)
      DIMENSION LC(40)
      DIMENSION FREQ(1), FLSP(1), DAMP(1), CFREQ(1), VFLSP(1)
C
      COMPLEX ROOT(40), ROPT(40), ROBT(40), VECT(40,40), VEC(40,40)
C
      COMMON /COMA  / LC, CR
C
      ITCH3 = LC(12)
      IF(ITCH3.GT.0)GO TO 2
      DO 3 I=1,NQ
      DENOM=CABS(ROOT(I))**2
      IF(DENOM.NE.0.0)GO TO 50
      ROOT(I)=CMPLX(0.0,0.0)
      GO TO 3
   50 CONTINUE
      RTRE=REAL(ROOT(I))/DENOM
      RTIM=-AIMAG(ROOT(I))/DENOM
    3 ROOT(I)=CMPLX(RTRE,RTIM)
    2 DO 4 I=1,NQ
      ZR=REAL(ROOT(I))
      IF(ZR.LE.0.0)GO TO 20
      TESTR=OMGR/(SQRT(ZR)*6.2832)
      IF(TESTR.LE.0.01)ZR=0.0
   20 CONTINUE
      ZI=AIMAG(ROOT(I))
      IF(ZR)5,6,7
    5 FREQ(I)=1.0E+45
      FLSP(I)=-0.0
      DAMP(I)=-0.0
      CFREQ(I)=-0.0
      VFLSP(I)=-0.0
      GO TO 4
    6 FREQ(I)=1.0E+35
      FLSP(I)=1.0E+35
      DAMP(I)=ZI*1.0E+15
      CFREQ(I)=1.0E+35
      VFLSP(I)=1.0E+35
      GO TO 4
    7 FREQ(I)=OMGR/SQRT(ZR)
      IF (FREQ(I).LE.1.0E-05) FREQ(I) = 0.0
      IF (NIV.NE.0) GO TO 9
      FLSP(I)=VBR*BR*FREQ(I)/1.6878
      GO TO 10
    9 FLSP(I)=FREQ(I)/1.6878
   10 VFLSP(I)=FLSP(I)*SQRT(RHQ)
      IF(NIV.NE.0)GO TO 4
      DAMP(I)=ZI/ZR
      IF (FREQ(I).EQ.0.0)     DAMP(I) = 0.0
      CFREQ(I)=FREQ(I)/6.2832
    4 CONTINUE
      CALL AORDER(FREQ,NQ,IPERM,1)
      DO 11 I=1,NQ
```

```
STATEMENT LABELS               DEF LINE   REFERENCES
   37  120                        30        2*29      48
   41  130                        32          29
    0  140                        35          32
    0  143                        39          36
    0  146                        43          42
    0  150                        45          20      40      44
    0  160         INACTIVE       49        2*48
    0  165                        51          50
    0  170                        59          58
    0  180                        60          52      56
  271  190                        61          31

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   14  150      K          20 45      144B               EXT REFS   ENTRIES   EXITS   NOT INNER
   20  110      I          23 28       16B               EXT REFS
   51  140      J          32 35        6B      INSTACK
   70  143      J          36 39        6B      INSTACK
  100  150      I          40 45       55B               NOT INNER
  123  146      J          42 43        7B      INSTACK
  143  150      J          44 45        7B      INSTACK
  207  165      J          50 51        5B      INSTACK
  216  180      I          52 60       53B               NOT INNER
  230  180      L          56 60       37B               NOT INNER
  242  170      J          58 59        7B      INSTACK

STATISTICS
  PROGRAM LENGTH                343B      227
          52000B CM USED
```

```
                 DO 170  J = KP,M                                              CLINEQ     59
             170 X = X + A(K,J)*Y(J,L)                                         CLINEQ     60
   60        180 Y(K,L) = (Y(K,L) - X) * Z                                     CLINEQ     61
             190 RETURN                                                        CLINEQ     62
                 END                                                           CLINEQ     63


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   62      I       20       NON-INNER LOOP BEGINNING AT THIS CARD IS ENTERED FROM OUTSIDE ITS RANGE.



      SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  CLINEQ          1          61

 VARIABLES      SN  TYPE          RELOCATION
     O  A           COMPLEX    ARRAY      F.P.     REFS        14        17        24        33        34      2*41      2*45
                                                     47        49        55        59   DEFINED         1        34        35
                                                     45
   307  G           REAL                           REFS        25        26   DEFINED        24
   306  I           INTEGER                        REFS        24        27        41      2*43      2*45
                                                DEFINED        23        40        52
   311  J           INTEGER                        REFS        33      2*34        35        37      2*38        39      3*43
                                                   3*45      2*51      2*59   DEFINED        32        36        42        44
                                                     50        58
   303  K           INTEGER                        REFS        21        23        24        30        33        34        37
                                                     38      3*41        43        45        53        54      2*55        59
                                                   2*60   DEFINED        20        46        54
   304  KP          INTEGER                        REFS        40        44        58   DEFINED        21        53
   310  L           INTEGER                        REFS        34        35        38        39        59      2*60
                                                DEFINED        27        56
     O  M           INTEGER               F.P.     REFS        19        23        32        40        44        46      2*47
                                                   2*49      2*51        58   DEFINED         1
     O  MID         IN  GER               F.P.     REFS      2*17   DEFINED         1
   302  M1          IN  GER                        REFS        20        52   DEFINED        19
     O  N           IN EGER               F.P.     REFS        36        42        50        56   DEFINED         1
     O  NIX         INTEGER               F.P.  DEFINED         1        18        30
   305  T           REAL                           REFS        25        29        48   DEFINED        22        26        47
   276  X           COMPLEX                        REFS        14        35        39        43        45        59        60
                                                DEFINED        33        37        41        57        59
     O  Y           COMPLEX    ARRAY      F.P.     REFS        14        17        37        38      2*43        51        59
                                                     60   DEFINED         1        38        39        43        51        60
   300  Z           COMPLEX                        REFS        14        51        60   DEFINED        49        55

 EXTERNALS             TYPE   ARGS          REFERENCES
        CDABSF         REAL      1             24        47

 STATEMENT LABELS              DEF LINE    REFERENCES
     O  100            INACTIVE     26          25
    33  110                         28          23      2*25
```

```
            SUBROUTINE CLINEQ(A,Y,M,N,MID,NIX)                                  CLINEQ     2
      C                                                                         CLINEQ     3
      C                                                                         CLINEQ     4
      C     SINGLE PRECISION VERSION                                            CLINEQ     5
      C     LINEAR SYSTEM SOLVER FOR COMPLEX ARRAYS                             CLINEQ     6
      C                                                                         CLINEQ     7
      C                                                                         CLINEQ     8
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       CLINEQ     9
      C     COMPLEX*16 A      ,X       ,Y       ,Z                            CLINEQ    10
      C     DOUBLE PRECISION       T ,           G                              CLINEQ    11
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS          CLINEQ    12
      C                                                                         CLINEQ    13
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       CLINEQ    14
            COMPLEX A       ,X       ,Y       ,Z                                CLINEQ    15
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          CLINEQ    16
      C                                                                         CLINEQ    17
            DIMENSION A(MID,1) , Y(MID,1)                                       CLINEQ    18
               NIX = 0                                                          CLINEQ    19
            M1 = M - 1                                                          CLINEQ    20
            DO 150  K = 1,M1                                                    CLINEQ    21
            KP = K + 1                                                          CLINEQ    22
            T = 0.00                                                            CLINEQ    23
            DO 110  I = K,M                                                     CLINEQ    24
            G  =  CDABSF(A(I,K))                                                CLINEQ    25
            IF (G - T) 110,110,100                                              CLINEQ    26
        100 T = G                                                               CLINEQ    27
            L = I                                                               CLINEQ    28
        110 CONTINUE                                                            CLINEQ    29
            IF (T) 120,120,130                                                  CLINEQ    30
        120 NIX = -K                                                            CLINEQ    31
            GO TO 190                                                           CLINEQ    32
        130 DO 140  J = 1,M                                                     CLINEQ    33
            X = A(K,J)                                                          CLINEQ    34
            A(K,J) = A(L,J)                                                     CLINEQ    35
        140 A(L,J) = X                                                          CLINEQ    36
            DO 143  J = 1,N                                                     CLINEQ    37
            X = Y(K,J)                                                          CLINEQ    38
            Y(K,J) = Y(L,J)                                                     CLINEQ    39
        143 Y(L,J) = X                                                          CLINEQ    40
            DO 150  I = KP,M                                                    CLINEQ    41
            X = A(I,K) / A(K,K)                                                 CLINEQ    42
            DO 146  J = 1,N                                                     CLINEQ    43
        146 Y(I,J) = Y(I,J) - Y(K,J)*X                                          CLINEQ    44
            DO 150  J = KP,M                                                    CLINEQ    45
        150 A(I,J) = A(I,J) - A(K,J)*X                                          CLINEQ    46
            K = M                                                               CLINEQ    47
            T  =  CDABSF(A(M,M))                                                CLINEQ    48
            IF (T) 160,120,160                                                  CLINEQ    49
        160  Z = (1.00,0.00) / A(M,M)                                           CLINEQ    50
            DO 165  J = 1,N                                                     CLINEQ    51
        165 Y(M,J) = Y(M,J) * Z                                                 CLINEQ    52
            DO 180  I = 1,M1                                                    CLINEQ    53
            KP = K                                                              CLINEQ    54
            K = K - 1                                                           CLINEQ    55
            Z = (1.00,0.00) / A(K,K)                                            CLINEQ    56
            DO 180  L = 1,N                                                     CLINEQ    57
            X = (0.00,0.00)                                                     CLINEQ    58
```

```
LOOPS  LABEL   INDEX    FROM-TO    LENGTH    PROPERTIES
  113  3       I         37 39         6B     INSTACK
  124  4       I         41 42        11B              EXT REFS
  141  5       I         45 57        47B              EXT REFS  NOT INNER
  152  6       J         49 55        31B              EXT REFS
  212  7       I         59 77        53B              EXT REFS  NOT INNER
  222  8       J         63 76        41B              EXT REFS

STATISTICS
  PROGRAM LENGTH              15153B    6763
        52000B CM USED
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```
STATEMENT LABELS            DEF LINE    REFERENCES
  464   1620    FMT           193          148
  474   1660    FMT           196          101
  503   1670    FMT           199          116
  513   1680    FMT           202          165

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   23   1        I            59 62        5B       INSTACK
   41   15       IV           74 81       27B                EXT REFS  NOT INNER
   56   15       IZ           76 81        6B       INSTACK
   71   20       IM           89 92       24B                EXT REFS  NOT INNER
  100            I            92 92       11B                EXT REFS
  230   7        I           173 180      22B                NOT INNER
  243   9        J           178 179       3B       INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMA          41               0 LC      (40)            40 BR      (1)
       PRPL           6               0 GMAX    (1)              1 GMIN    (1)              2 FRMAX   (1)
                                      3 FRMIN   (1)              4 VMAX    (1)              5 VMIN    (1)
       FLUTAN        48               0 FMACH   (1)              1 BETA    (1)              2 VBO     (30)
                                     32 RVBO    (15)            47 NRVBO   (1)
       FLUTV          7               0 VL      (1)              1 VH      (1)              2 FLO     (1)
                                      3 FHI     (1)              4 IE      (1)              5 NQZ     (1)
                                      6 NVTOT   (1)
       CTAPES        50               0 ITAPES  (50)
       KLUES         24               0 KLUSE   (1)              1 KLUNAL  (1)              2 IRED    (1)
                                      3 KLUMD   (1)              4 KLUBAL  (1)              5 MSADD   (1)
                                      6 NPAS    (1)              7 IDNOPT  (1)              8 VDES    (1)
                                      9 EPS1    (1)             10 DWMAX   (1)             11 NBAR    (1)
                                     12 NFIX    (1)             13 D       (1)             14 DEL     (1)
                                     15 EPS2    (1)             16 NCYC    (1)             17 NNN     (1)
                                     18 IBAND   (1)             19 IFIN    (1)             20 KLUB    (1)
                                     21 KLUQ    (1)             22 MORBAL  (1)             23 DBAL    (1)
       CLIST         11               0 KOUNT   (1)              1 KPAGE   (1)              2 LINES   (1)
                                      3 LINEST  (1)              4 KLABEL  (1)              5 KTPAGE  (1)
                                      6 NPAGE   (1)              7 KBPAGE  (1)              8 LINESG  (1)
                                      9 KOUNTH  (1)             10 KOUNTI  (1)
       CTABLE         8               0 KTABLE  (1)              1 NPASS   (1)              2 NROWS   (1)
                                      3 NCOLS   (1)              4 NCOLST  (1)              5 KTABLO  (1)
                                      6 NPAGEA  (1)              7 ITAPET  (1)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
GMAX   GMAX           1               0 DUMD1   (1)

STATISTICS
  PROGRAM LENGTH                 50224B   20628
  CM LABELED COMMON LENGTH         303B     195
          52000B CM USED
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```
      SUBROUTINE FLUTAP (KPLOTV,KPLOTF,NPLOTF)                          FLUTAP     2
C                                                                       FLUTAP     3
      INTEGER YES                                                       FLUTAP     4
C                                                                       FLUTAP     5
C                                                                       FLUTAP     6
CIBM                                                                    FLUTAP     7
C     DIMENSION BUFFER(1512)                                            FLUTAP     8
CIBM                                                                    FLUTAP     9
C                                                                       FLUTAP    10
CCDC                                                                    FLUTAP    11
      DIMENSION BUFFER(512)                                             FLUTAP    12
      DIMENSION CNAME(2)                                                FLUTAP    13
CCDC                                                                    FLUTAP    14
C                                                                       FLUTAP    15
      DIMENSION VBO(30), RVBO(15)                                       FLUTAP    16
      DIMENSION      TITLE1(18) ,    TITLE2(18)                         FLUTAP    17
      DIMENSION          LC(40)                                         FLUTAP    18
      DIMENSION ITAPES(50)                                              FLUTAP    19
      DIMENSION         TSHF(1)                                         FLUTAP    20
C                                                                       FLUTAP    21
      COMMON /COMAX / LC,BR                                             FLUTAP    22
      COMMON /PRPLX / GMAX,GMIN,FRMAX,FRMIN,VMAX,VMIN                   FLUTAP    23
      COMMON /CTAPES/ ITAPES                                            FLUTAP    24
      COMMON /CTSHF / LTSHF, TSHF                                       FLUTAP    25
      COMMON /CALCPX/ TITLE1,TITLE2,DUB,FUB,VUB,DLB,                    FLUTAP    26
     1                FLB,VLB,IPLOT,LSD,DSCALE,FSCALE,VSCALE,           FLUTAP    27
     2                DPLEN,FRLEN,VLEN,XDT                              FLUTAP    28
      COMMON /FLUTVX/ VL,VH,FLO,FHI,IE,NQZ,NVTOT                        FLUTAP    29
      COMMON /CPLOTS/ KPLOTS                                            FLUTAP    30
      COMMON /CONSTS/ NO     ,YES                                       FLUTAP    31
      COMMON /COMRWP/ ITAPER,ITAPEW,IPUNCH                              FLUTAP    32
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   FLUTAP    33
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       FLUTAP    34
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA  FLUTAP    35
     1               ,ITAPET                                            FLUTAP    36
C                                                                       FLUTAP    37
CCDC                                                                    FLUTAP    38
      DATA CNAME/4HCALC,4HOMP /                                         FLUTAP    39
CCDC                                                                    FLUTAP    40
C                                                                       FLUTAP    41
C INITIAL CONDITIONS                                                    FLUTAP    42
C                                                                       FLUTAP    43
      MTAP1  =  ITAPES(37)                                              FLUTAP    44
      CALL PROGNA (4H(FLU, 4HTAP))                                      FLUTAP    45
      KOUNT  =  LINES                                                   FLUTAP    46
      KFIRST =  YES                                                     FLUTAP    47
C                                                                       FLUTAP    48
C PLOT FLUTTER RESULTS                                                  FLUTAP    49
C                                                                       FLUTAP    50
      REWIND MTAP1                                                      FLUTAP    51
      READ (MTAP1) (LC(I),I=1,40), BR, GMAX, GMIN, FRMAX, FRMIN,        FLUTAP    52
     1             VMAX, VMIN, FMACH, BETA, VBO, RVBO, NRVBO,           FLUTAP    53
     2             (TITLE1(J),J=1,18), (TITLE2(J),J=1,18),              FLUTAP    54
     3             DUB, FUB, VUB, DLB, FLB, VLB, IPLOT, LSD,            FLUTAP    55
     4             DSCALE, FSCALE, VSCALE, DPLEN, FRLEN, VLEN, XDT      FLUTAP    56
      NRHOV  =  LC(5)                                                   FLUTAP    57
      NSTIV  =  LC(26) + 1                                              FLUTAP    58
```

```
      NMODV  =  LC(25) + 1
C
      IF (KPLOTS .EQ. NO) GO TO 25
      KPLOTS =  NO
C
      NPLOTF =  O
      CALL TITLES(2)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1100)
      IF (KOUNT .EQ  KOUNTH) KOUNT = KOUNT + 2
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,2500)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 3
C
CIBM
C     IBUFD  =  1512
C     CALL PLOTS (BUFFER,IBUFD)
CIBM
C
CCDC
      IBUFD = 512
      ITAP60 = 60
      REWIND ITAP60
      CALL PLOTS (BUFFER,IBUFD,ITAP60)
      CALL PLOT (5.0,0.5,-3)
CCDC
C
   25 CONTINUE
C
C CALCOMP PLOT LOOP FOR NUMBER OF DENSITY VARIATIONS
C
      DO 300 IRHOV=1,NRHOV
      READ (MTAP1)RHOP, FMACH
C
C
C CALCOMP PLOT LOOP FOR NUMBER OF STIFFNESS VARIATION CYCLES
C
      DO 200 ISTIV=1,NSTIV
C
C
C CALCOMP PLOT LOOP FOR NUMBER OF MODAL ELIMINATION CYCLES
C
      DO 100 IMODV=1,NMODV
C
      READ (MTAP1) VL,VH,FLO,FHI,IE,NQZ,NVTOT
   50 CONTINUE
C
      CALL VGPT (FMACH,RHOP)
C
      CALL TITLES (2)
      IF (KFIRST .EQ. YES) GO TO 80
      IF (KOUNT .GT. KOUNTH) GO TO 90
   80 CONTINUE
      KFIRST =  NO
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,2600)
```

```
          CALL PLB (1,1,ITAPEW)                                        FLUTAP     116
          KOUNT  =  KOUNT + 4                                          FLUTAP     117
       90 CONTINUE                                                     FLUTAP     118
          KOUNT  =  KOUNT + 1                                          FLUTAP     119
          NPLOTF =  NPLOTF + 1                                         FLUTAP     120
          WRITE (ITAPEW,2700) NPASS,NPLOTF,FMACH,RHOP,IRHOV,ISTIV,IMODV FLUTAP     121
      100 CONTINUE                                                     FLUTAP     122
      200 CONTINUE                                                     FLUTAP     123
      300 CONTINUE                                                     FLUTAP     124
          REWIND MTAP1                                                 FLUTAP     125
C                                                                      FLUTAP     126
C                                                                      FLUTAP     127
C TERMINATE PLOTTING                                                   FLUTAP     128
C                                                                      FLUTAP     129
          KOUNT  =  KOUNT + 2                                          FLUTAP     130
          CALL TITLES (2)                                              FLUTAP     131
          CALL PLB (1,1,ITAPEW)                                        FLUTAP     132
          WRITE (ITAPEW,1200)                                          FLUTAP     133
          IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + 2                     FLUTAP     134
C                                                                      FLUTAP     135
          CALL TIMEB (34,34HFROM FLUTAP - PLOT FLUTTER RESULTS)        FLUTAP     136
C                                                                      FLUTAP     137
     1100 FORMAT (10X,37HINITIALIZE PLOTTING IN PROGRAM FLUTAP)        FLUTAP     138
     1200 FORMAT (10X,37HTERMINATE PLOTTING IN PROGRAM FLUTAP )        FLUTAP     139
     2500 FORMAT (10X,24HSUMMARY OF FLUTTER PLOTS)                     FLUTAP     140
     2600 FORMAT (10X,50H PASS PLOT      MACH   DENSITY   DENSITY STIFFNESS FLUTAP 141
        1                10H     MODAL                                 FLUTAP     142
        2      ,/,10X,50H   NO   NO         NO      RATIO   LOOP NO   LOOP NO  FLUTAP 143
        3                ,10H   LOOP NO)                               FLUTAP     144
     2700 FORMAT (10X,2I5,2F10.5,3I10)                                 FLUTAP     145
          RETURN                                                       FLUTAP     146
          END                                                          FLUTAP     147
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 FLUTAP	1	145

VARIABLES	SN	TYPE	RELOCATION							
361 BETA	*	REAL			DEFINED	51				
50 BR		REAL		COMAX	REFS	21	DEFINED	51		
375 BUFFER		REAL	ARRAY		REFS	11	82			
1375 CNAME		REAL	ARRAY		REFS	12	DEFINED	38		
47 DLB		REAL		CALCPX	REFS	25	DEFINED	51		
57 DPLEN		REAL		CALCPX	REFS	25	DEFINED	51		
54 DSCALE		REAL		CALCPX	REFS	25	DEFINED	51		
44 DUB		REAL		CALCPX	REFS	25	DEFINED	51		
3 FHI		REAL		FLUTVX	REFS	28	DEFINED	103		
50 FLB		REAL		CALCPX	REFS	25	DEFINED	51		
2 FLO		REAL		FLUTVX	REFS	28	DEFINED	103		
360 FMACH		REAL			REFS	106	120	DEFINED	51	91
60 FRLEN		REAL		CALCPX	REFS	25	DEFINED	51		
2 FRMAX		REAL		PRPLX	REFS	22	DEFINED	51		

```
VARIABLES      SN  TYPE            RELOCATION
     3  FRMIN      REAL               PRPLX      REFS        22   DEFINED      51
    55  FSCALE     REAL               CALCPX     REFS        25   DEFINED      51
    45  FUB        REAL               CALCPX     REFS        25   DEFINED      51
     0  GMAX       REAL               PRPLX      REFS        22   DEFINED      51
     1  GMIN       REAL               PRPLX      REFS        22   DEFINED      51
   357  I          INTEGER                       REFS        51   DEFINED      51
   367  IBUFD      INTEGER                       REFS        82   DEFINED      79
     4  IE         INTEGER            FLUTVX     REFS        28   DEFINED     103
   374  IMODV      INTEGER                       REFS       120   DEFINED     101
    52  IPLOT      INTEGER            CALCPX     REFS        25   DEFINED      51
     2  IPUNCH     INTEGER            COMRWP     REFS        31
   371  IRHOV      INTEGER                       REFS       120   DEFINED      90
   373  ISTIV      INTEGER                       REFS       120   DEFINED      96
     0  ITAPER     INTEGER            COMRWP     REFS        31
     0  ITAPES     INTEGER    ARRAY   CTAPES     REFS        18        23      43
     7  ITAPET     INTEGER            CTABLE     REFS        34
     1  ITAPEW     INTEGER            COMRWP     REFS        31        65      68       70      113      115      131
                                             I/O REFS        66        69     114      120      132
   370  ITAP60     INTEGER                       REFS        82   DEFINED      80  I/O REFS       81
   363  J          INTEGER                       REFS      2*51   DEFINED    2*51
     7  KBPAGE     INTEGER            CLIST      REFS        32
   356  KFIRST     INTEGER                       REFS       109   DEFINED      46      112
     4  KLABEL     INTEGER            CLIST      REFS        32
     0  KOUNT      INTEGER            CLIST      REFS        32      2*67      71      110      116      118      129
                                                 2*133  DEFINED        45      67       71      116      118      129
                                                  133
    11  KOUNTH     INTEGER            CLIST      REFS        32        67     110      133
    12  KOUNTI     INTEGER            CLIST      REFS        32
     1  KPAGE      INTEGER            CLIST      REFS        32
     0  KPLOTF     INTEGER   *UNUSED   F.P.   DEFINED         1
     0  KPLOTS     INTEGER            CPLOTS     REFS        29        60  DEFINED       61
     0  KPLOTV     INTEGER   *UNUSED   F.P.   DEFINED         1
     0  KTABLE     INTEGER            CTABLE     REFS        34
     5  KTABLO     INTEGER            CTABLE     REFS        34
     5  KTPAGE     INTEGER            CLIST      REFS        32
     0  LC         INTEGER    ARRAY   COMAX      REFS        17        21      56       57       58
                                              DEFINED        51
     2  LINES      INTEGER            CLIST      REFS        32        45
    10  LINESG     INTEGER            CLIST      REFS        32
     3  LINEST     INTEGER            CLIST      REFS        32
    53  LSD        INTEGER            CALCPX     REFS        25   DEFINED      51
     0  LTSHF      INTEGER            CTSHF      REFS        24
   355  MTAP1      INTEGER                    DEFINED        43  I/O REFS      50       51       91      103      124
     3  NCOLS      INTEGER            CTABLE     REFS        34
     4  NCOLST     INTEGER            CTABLE     REFS        34
   366  NMODV      INTEGER                       REFS       101   DEFINED      58
     0  NO         INTEGER            CONSTS     REFS        30        60      61      112
     6  NPAGE      INTEGER            CLIST      REFS        32
     6  NPAGEA     INTEGER            CTABLE     REFS        34
     1  NPASS      INTEGER            CTABLE     REFS        34       120
     0  NPLOTF     INTEGER             F.P.      REFS       119       120  DEFINED        1       63      119
     5  NQZ        INTEGER            FLUTVX     REFS        28   DEFINED     103
   364  NRHOV      INTEGER                       REFS        90   DEFINED      56
     2  NROWS      INTEGER            CTABLE     REFS        34
   362  NRVBO    * INTEGER                    DEFINED        51
   365  NSTIV      INTEGER                       REFS        96   DEFINED      57
     6  NVTOT      INTEGER            FLUTVX     REFS        28   DEFINED     103
```

```
VARIABLES      SN  TYPE           RELOCATION
  372  RHOP        REAL                                REFS      106      120  DEFINED     91
 1435  RVBO        REAL      ARRAY                     REFS       15  DEFINED       51
    0  TITLE1      REAL      ARRAY    CALCPX           REFS       16       25  DEFINED     51
   22  TITLE2      REAL      ARRAY    CALCPX           REFS       16       25  DEFINED     51
    1  TSHF        REAL      ARRAY    CTSHF            REFS       19       24
 1377  VBO         REAL      ARRAY                     REFS       15  DEFINED       51
    1  VH          REAL               FLUTVX           REFS       28  DEFINED      103
    0  VL          REAL               FLUTVX           REFS       28  DEFINED      103
   51  VLB         REAL               CALCPX           REFS       25  DEFINED       51
   61  VLEN        REAL               CALCPX           REFS       25  DEFINED       51
    4  VMAX        REAL               PRPLX            REFS       22  DEFINED       51
    5  VMIN        REAL               PRPLX            REFS       22  DEFINED       51
   56  VSCALE      REAL               CALCPX           REFS       25  DEFINED       51
   46  VUB         REAL               CALCPX           REFS       25  DEFINED       51
   62  XDT         REAL               CALCPX           REFS       25  DEFINED       51
    1  YES         INTEGER            CONSTS           REFS        3       30       46    109
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
       PLB                  3              65        68       70      113      115    131
       PLOT                 3              83
       PLOTS                3              82
       PROGNA               2              44
       TIMEB                2             135
       TITLES               1              64       108      130
       VGPT                 2             106

STATEMENT LABELS               DEF LINE    REFERENCES
   61  25                           86          60
    0  50          INACTIVE        104
  100  80                          111         109
  111  90                          117         110
    0  100                         121         101
    0  200                         122          96
    0  300                         123          90
  304  1100    FMT                 137          66
  312  1200    FMT                 138         132
  320  2500    FMT                 139          69
  325  2600    FMT                 140         114
  345  2700    FMT                 144         120

LOOPS  LABEL    INDEX     FROM-TO     LENGTH     PROPERTIES
   62  300      IRHOV      90 123        43B               EXT REFS  NOT INNER
   65  200      ISTIV      96 122        35B               EXT REFS  NOT INNER
   66  100      IMODV     101 121        32B               EXT REFS

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       COMAX         41             0 LC      (40)          40 BR      (1)
       PRPLX          6             0 GMAX    (1)            1 GMIN    (1)            2 FRMAX   (1)
                                    3 FRMIN   (1)            4 VMAX    (1)            5 VMIN    (1)
       CTAPES        50             0 ITAPES  (50)
       CTSHF          2             0 LTSHF   (1)            1 TSHF    (1)
       CALCPX        51             0 TITLE1  (18)          18 TITLE2  (18)          36 DUB     (1)
                                   37 FUB     (1)           38 VUB     (1)           39 DLB     (1)
                                   40 FLB     (1)           41 VLB     (1)           42 IPLOT   (1)
                                   43 LSD     (1)           44 DSCALE  (1)           45 FSCALE  (1)
                                   46 VSCALE  (1)           47 DPLEN   (1)           48 FRLEN   (1)
```

```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
                                  49 VLEN    (1)            50 XDT     (1)
      FLUTVX         7             0 VL      (1)             1 VH      (1)            2 FLO     (1)
                                   3 FHI     (1)             4 IE      (1)            5 NQZ     (1)
                                   6 NVTOT   (1)
      CPLOTS         1             0 KPLOTS  (1)
      CONSTS         2             0 NO      (1)             1 YES     (1)
      COMRWP         3             0 ITAPER  (1)             1 ITAPEW  (1)            2 IPUNCH  (1)
      CLIST         11             0 KOUNT   (1)             1 KPAGE   (1)            2 LINES   (1)
                                   3 LINEST  (1)             4 KLABEL  (1)            5 KTPAGE  (1)
                                   6 NPAGE   (1)             7 KBPAGE  (1)            8 LINESG  (1)
                                   9 KOUNTH  (1)            10 KOUNTI  (1)
      CTABLE         8             0 KTABLE  (1)             1 NPASS   (1)            2 NROWS   (1)
                                   3 NCOLS   (1)             4 NCOLST  (1)            5 KTABLO  (1)
                                   6 NPAGEA  (1)             7 ITAPET  (1)

STATISTICS
  PROGRAM LENGTH                 1467B       823
  CM LABELED COMMON LENGTH        266B       182
          52000B CM USED
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```
      SUBROUTINE VGPT (ACH,RHO)                                           VGPT   2
C                                                                         VGPT   3
C     CALCOMP ORDERING ROUTINE FOR MAXIMUM EFFICIENCY ----------------    VGPT   4
C                                                                         VGPT   5
      DIMENSION        VA(100) ,      VB(100) ,      DA(100)              VGPT   6
      DIMENSION        FA(100) ,      FB(100) ,      DB(100)              VGPT   7
      DIMENSION A(3,40), F(4000), D(4000), V(4000)                        VGPT   8
      DIMENSION ITAPES(50)                                                VGPT   9
      DIMENSION   TITLE1(18), TITLE2(18)                                  VGPT  10
C                                                                         VGPT  11
      COMMON /COMAX / LC(40), BR                                          VGPT  12
      COMMON /FLUTVX/ VL,VH,FLO,FHI,IE,NQZ,NVTOT                          VGPT  13
      COMMON / CTAPES / ITAPES                                            VGPT  14
      COMMON /CTSHF / LTSHF, TSHF                                         VGPT  15
      COMMON /CALCPX/ TITLE1,TITLE2,DUB,FUB,VUB,DLB,                      VGPT  16
     1               FLB, VLB, IPLOT, LSD, DSCALE, FSCALE, VSCALE,        VGPT  17
     2               DPLEN, FRLEN, VLEN, XDT                              VGPT  18
C                                                                         VGPT  19
C INITIAL CONDITIONS                                                      VGPT  20
C                                                                         VGPT  21
C     LSD = 1        VERTICAL PLOTS                                       VGPT  22
C     LSD = 2        HORIZONTAL PLOTS                                     VGPT  23
C     LSD = 3        SEPARATE VERTICAL PLOTS                              VGPT  24
C                                                                         VGPT  25
      MTAP1 = ITAPES(37)                                                  VGPT  26
      NV = NVTOT                                                          VGPT  27
      IPLOT  =  LC(15)                                                    VGPT  28
C                                                                         VGPT  29
C                                                                         VGPT  30
C READ DATA FROM UNIT MTAP1 AND PLOT FOR.                                 VGPT  31
C   1.  PRESSURE CALCULATIONS (LC(1) = 0)                                 VGPT  32
C   2.  K-FLUTTER ANALYSIS     (LC(1) = 1)                                VGPT  33
C   3.  DIVERGENCE ANALYSIS   (LC(1) = 2)                                 VGPT  34
C                                                                         VGPT  35
      IF ( LC(1) .EQ. -1 )    GO TO 10                                    VGPT  36
      NVB  =  LC(4)                                                       VGPT  37
      NV = NVB                                                            VGPT  38
      DO 1  IV = 1,NVB                                                    VGPT  39
      READ (MTAP1) ((A(I,J),I=1,3),J=1,NQZ)                               VGPT  40
      DO 1 IZ= 1,NQZ                                                      VGPT  41
      INDX = (IZ-1)*NVB + IV                                              VGPT  42
      F(INDX) = A(1,IZ)                                                   VGPT  43
      D(INDX) = A(2,IZ)                                                   VGPT  44
      V(INDX) = A(3,IZ)                                                   VGPT  45
    1 CONTINUE                                                            VGPT  46
      GO TO 2                                                             VGPT  47
C                                                                         VGPT  48
C                                                                         VGPT  49
C READ DATA FROM UNIT MTAP2 AND PLOT FOR                                  VGPT  50
C   1.  P-K FLUTTER ANALYSIS AND/OR  (LC(1) = -1)                         VGPT  51
C   2.  FLUTTER REDESIGN             (LC(1) = -1)                         VGPT  52
C                                                                         VGPT  53
   10 DO 3  IM = 1,NQZ                                                    VGPT  54
      J1  =  (IM-1) *NVTOT + 1                                            VGPT  55
      J2  =  IM * NVTOT                                                   VGPT  56
    3 READ (MTAP1) (F(I),D(I),V(I),I=J1,J2)                               VGPT  57
    2 CONTINUE                                                            VGPT  58
```

```
      C
      C
      C REARRANGE DATA AND BEGIN PLOTTING
      C
            CALL AXPL (DMPORI,DMPZER,DSTART,FORG,DSV,VOR,VDIS,
           1           XDNP,ACH,RHO)
      C     DAMPING PLOT ORDERING    -----------------------------
            KL        =  O
            DO 5  I = 1,NQZ
            ISYM      =  I - 14 * ((I-1)/14) + 1
            KL        =  KL + 1
            KL        =  KL - KL * (KL/2)
            DO 6  J = 1,NV
            K         =  (I-1) * NV + J
            II        =  J
            IF ( KL .NE. O )   II = NV + 1 - J
            DA(II)    =  D(K)
          6 VA(II)    =  V(K)
            N         =  O
            DO 7  K = 1,NV
            IF (VA(K).GT.VLB.AND.VA(K).LT.VUB.AND.DA(K).GT.DLB.AND.DA(K).LT.
           1 DUB )         GO TO 8
            GO TO 7
          8 N         =  N + 1
            VB(N)     =  VA(K)
            DB(N)     =  DA(K)
          7 CONTINUE
            IF ( N .EQ. O )    GO TO 5
            IF ( LSD .EQ. 2 )  GO TO 9
      C
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
      C     CALL SCALE (DB,N,DPLEN,DMPZER,DSCALE,1,1)
      C     CALL SCALE (VB,N,VLEN,.O,VSCALE,1,1)
      C     CALL LINE (VB,DB,N,1,1,ISYM,1,.1)
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
      C
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
            DB(N+1) = DMPZER
            DB(N+2) = DSCALE
            VB(N+1) = O.O
            VB(N+2) = VSCALE
            CALL LINE (VB, DB, N, 1, -1, ISYM)
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      C
            GO TO 5
      C
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
      C   9 CALL SCALE (DB,N,DPLEN,DMPZER,-DSCALE,1,1)
      C     CALL SCALE (VB,N,VLEN,.O,VSCALE,1,1)
      C     CALL LINE (DB,VB,N,1,1,ISYM,1,.1)
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
      C
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
          9 CONTINUE
            DB(N+1) = DMPZER
            DB(N+2) =-DSCALE
            VB(N+1) = O.O
```

```
      VB(N+2) = VSCALE                                                  VGPT     116
      CALL LINE (DB, VB, N, 1, -1, ISYM)                                VGPT     117
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        VGPT     118
C                                                                       VGPT     119
    5 CONTINUE                                                          VGPT     120
      IF  (  LSD .EQ. 3 )     CALL PLOT (XDNP,0.0,-3)                   VGPT     121
      CALL TIPL (FORG,VOR,ACH,RHO,DSV,VDIS)                             VGPT     122
      DO 19  I=1,NQZ                                                    VGPT     123
      ISYM      =  I - 14 * ((I-1)/14) + 1                              VGPT     124
      KL        =  KL + 1                                               VGPT     125
      KL        =  KL - KL * (KL/2)                                     VGPT     126
      DO 20  J = 1,NV                                                   VGPT     127
      K         =  (I-1) * NV + J                                       VGPT     128
      II        =  J                                                    VGPT     129
      IF ( KL .NE. 0 )   II = NV + 1 - J                                VGPT     130
      FA(II)    =  F(K)                                                 VGPT     131
   20 VA(II)    =  V(K)                                                 VGPT     132
      N         =  0                                                    VGPT     133
      DO 21  K = 1,NV                                                   VGPT     134
      IF (VA(K).GT.VLB.AND.VA(K).LT.VUB.AND.FA(K).GT.FLB.AND.FA(K).LT.  VGPT     135
     1FUB)     GO TO 22                                                 VGPT     136
      GO TO 21                                                          VGPT     137
   22 N         =  N + 1                                                VGPT     138
      FB(N)     =  FA(K)                                                VGPT     139
      VB(N)     =  VA(K)                                                VGPT     140
   21 CONTINUE                                                          VGPT     141
      IF ( N .EQ. 0 )    GO TO 19                                       VGPT     142
      GO TO ( 31 , 32 , 33 ) , LSD                                      VGPT     143
C                                                                       VGPT     144
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     VGPT     145
C  31 CALL SCALE (VB,N,VLEN,.0,VSCALE,1,1)                              VGPT     146
C     CALL SCALE (FB,N,FRLEN,.0,FSCALE,1,1)                             VGPT     147
C     CALL LINE (VB,FB,N,1,1,ISYM,1,.1)                                 VGPT     148
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        VGPT     149
C                                                                       VGPT     150
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     VGPT     151
   31 CONTINUE                                                          VGPT     152
      VB(N+1) = 0.0                                                     VGPT     153
      VB(N+2) = VSCALE                                                  VGPT     154
      FB(N+1) = 0.0                                                     VGPT     155
      FB(N+2) = FSCALE                                                  VGPT     156
      CALL LINE (VB, FB, N, 1, -1, ISYM)                                VGPT     157
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        VGPT     158
C                                                                       VGPT     159
      GO TO 19                                                          VGPT     160
C                                                                       VGPT     161
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     VGPT     162
C  32 CALL SCALE (FB,N,FRLEN,VOR,-FSCALE,1,1)                           VGPT     163
C     CALL SCALE (VB,N,VLEN,.0,VSCALE,1,1)                              VGPT     164
C     CALL LINE (FB,VB,N,1,1,ISYM,1,.1)                                 VGPT     165
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        VGPT     166
C                                                                       VGPT     167
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     VGPT     168
   32 CONTINUE                                                          VGPT     169
      FB(N+1) = VOR                                                     VGPT     170
      FB(N+2) =-FSCALE                                                  VGPT     171
      VB(N+1) = 0.0                                                     VGPT     172
```

```
             VB(N+2) = VSCALE                                               VGPT       173
             CALL LINE (FB, VB, N, 1, -1, ISYM)                             VGPT       174
      CCDC   ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     VGPT       175
      C                                                                     VGPT       176
             GO TO 19                                                       VGPT       177
      C                                                                     VGPT       178
      CIBM   BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS  VGPT       179
      C   33 CALL SCALE (VB,N,VLEN,VOR,VSCALE,1,1)                          VGPT       180
      C      CALL SCALE (FB,N,FRLEN,.O,FSCALE,1,1)                          VGPT       181
      C      CALL LINE (VB,FB,N,1,1,ISYM,1,.1)                              VGPT       182
      CIBM   ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     VGPT       183
      C                                                                     VGPT       184
      CCDC   BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS  VGPT       185
          33 CONTINUE                                                       VGPT       186
             VB(N+1) = VOR                                                  VGPT       187
             VB(N+2) = VSCALE                                               VGPT       188
             FB(N+1) = O.O                                                  VGPT       189
             FB(N+2) = FSCALE                                               VGPT       190
             CALL LINE (VB, FB, N,1, -1,ISYM)                               VGPT       191
      CCDC   ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     VGPT       192
      C                                                                     VGPT       193
          19 CONTINUE                                                       VGPT       194
      C      SPECIFY DISTANCE TO NEXT PLOT                                  VGPT       195
             XDNP     =  XDT + 1.5                                          VGPT       196
             CALL PLOT (XDNP,O.O,-3)                                        VGPT       197
      C                                                                     VGPT       198
             RETURN                                                         VGPT       199
             END                                                            VGPT       200
```

```
CARD NR. SEVERITY  DETAILS   DIAGNOSIS OF PROBLEM

   142     I                 AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  VGPT           1          198

VARIABLES      SN  TYPE           RELOCATION
  1612  A          REAL       ARRAY                REFS       7      42      43      44   DEFINED     39
     O  ACH        REAL                  F.P.      REFS      62     121  DEFINED      1
    50  BR         REAL                 COMAX      REFS      11
 11642  D          REAL       ARRAY                REFS       7      74  DEFINED     43        56
   772  DA         REAL       ARRAY                REFS       5    2*78      83  DEFINED      74
  1446  DB         REAL       ARRAY                REFS       6      99     116  DEFINED      83      95      96
                                                    112     113
    47  DLB        REAL                CALCPX      REFS      15      78
   445  DMPORI   * REAL                            REFS      62
   446  DMPZER     REAL                            REFS      62      95     112
    57  DPLEN      REAL                CALCPX      REFS      15
```

```
VARIABLES      SN  TYPE             RELOCATION
   54  DSCALE      REAL                 CALCPX      REFS        15       96      113
  447  DSTART   *  REAL                             REFS        62
  451  DSV         REAL                             REFS        62      121
   44  DUB         REAL                 CALCPX      REFS        15       78
 2002  F           REAL        ARRAY                REFS         7      130   DEFINED       42       56
 1136  FA          REAL        ARRAY                REFS         6    2*134      138   DEFINED      130
 1302  FB          REAL        ARRAY                REFS         6      156      173      190   DEFINED      138      154
                                                     155       169      170      188      189
    3  FHI         REAL                 FLUTVX      REFS        12
   50  FLB         REAL                 CALCPX      REFS        15      134
    2  FLO         REAL                 FLUTVX      REFS        12
  450  FORG        REAL                             REFS        62      121
   60  FRLEN       REAL                 CALCPX      REFS        15
   55  FSCALE      REAL                 CALCPX      REFS        15      155      170      189
   45  FUB         REAL                 CALCPX      REFS        15      134
  436  I           INTEGER                          REFS        39     3*56     2*67       71    2*123      127
                                                 DEFINED        39       56       66      122
    4  IE          INTEGER              FLUTVX      REFS        12
  460  II          INTEGER                          REFS        74       75      130      131   DEFINED       72       73
                                                     128       129
  442  IM          INTEGER                          REFS        54       55   DEFINED       53
  441  INDX        INTEGER                          REFS        42       43       44   DEFINED       41
   52  IPLOT       INTEGER              CALCPX      REFS        15   DEFINED       27
  456  ISYM        INTEGER                          REFS        99      116      156      173      190
                                                 DEFINED        67      123
    0  ITAPES      INTEGER     ARRAY    CTAPES      REFS         8       13       25
  435  IV          INTEGER                          REFS        41   DEFINED       38
  440  IZ          INTEGER                          REFS        41       42       43       44   DEFINED       40
  437  J           INTEGER                          REFS        39       71       72       73      127      128      129
                                                 DEFINED        39       70      126
  443  J1          INTEGER                          REFS        56   DEF!NED       54
  444  J2          INTEGER                          REFS        56   DEFINED       55
  457  K           IN;EGER                          REFS        74       75     4*78       82       83      130      131
                                                   4*134       138      139   DEFINED       71       77      127      133
  455  KL          INTEGER                          REFS        68     3*69       73      124    3*125      129
                                                 DEFINED        65       68       69      124      125
    0  LC          INTEGER     ARRAY    COMAX       REFS        11       27       35       36
   53  LSD         INTEGER              CALCPX      REFS        15       86      120      142
    0  LTSHF       INTEGER              CTSHF       REFS        14
  432  MTAP1       INTEGER                       DEFINED        25   I/O REFS      39       56
  461  N           INTEGER                          REFS        81       82       83       85       95       96       97
                                                      98        99      112      113      114      115      116      137
                                                     138       139      141      152      153      154      155      156
                                                     169       170      171      172      173      186      187      188
                                                     189       190   DEFINED       76       81      132      137
    5  NQZ         INTEGER              FLUTVX      REFS        12       39       40       53       66      122
  433  NV          INTEGER                          REFS        70       71       73       77      126      127      129
                                                     133   DEFINED       26       37
  434  NVB         INTEGER                          REFS        37       38       41   DEFINED       36
    6  NVTOT       INTEGER              FLUTVX      REFS        12       26       54       55
    0  RHO         REAL                  F.P.       REFS        62      121   DEFINED        1
    0  TITLE1      REAL        ARRAY    CALCPX      REFS         9       15
   22  TITLE2      REAL        ARRAY    CALCPX      REFS         9       15
    1  TSHF        REAL                 CTSHF       REFS        14
21502  V           REAL        ARRAY                REFS         7       75      131   DEFINED       44       56
  462  VA          REAL        ARRAY                REFS         5     2*78       82    2*134      139
                                                 DEFINED        75      131
```

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VARIABLES     SN  TYPE            RELOCATION
  626  VB         REAL       ARRAY                    REFS        5         99        116        156        173        190
                                                   DEFINED       82         97         98        114        115        139        152
                                                        153     171        172        186        187
  453  VDIS       REAL                                REFS       62        121
    1  VH         REAL                FLUTVX          REFS       12
    0  VL         REAL                FLUTVX          REFS       12
   51  VLB        REAL                CALCPX          REFS       15         78        134
   61  VLEN       REAL                CALCPX          REFS       15
  452  VOR        REAL                                REFS       62        121        169        186
   56  VSCALE     REAL                CALCPX          REFS       15         98        115        153        172        187
   46  VUB        REAL                CALCPX          REFS       15         78        134
  454  XDNP       REAL                                REFS       62        120        196     DEFINED       195
   62  XDT        REAL                CALCPX          REFS       15        195
       VARIABLES USED AS FILE NAMES, SLE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       AXPL                   10             62
       LINE                    6             99        116        156        173        190
       PLOT                    3            120        196
       TIPL                    6            121

STATEMENT LABELS               DEF LINE   REFERENCES
    0  1                          45         38         40
   72  2                          57         46
    0  3                          56         53
  173  5                         119         66         85        102
    0  6                          75         70
  145  7                          84         77         80
  142  8                          81         78
  163  9                         111         86
   45  10                         53         35
  320  19                        193        122        141        159        176
    0  20                        131        126
  254  21                        140        133        136
  251  22                        137        134
  267  31                        151        142
  277  32                        168        142
  310  33                        185        142

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   16  1         IV          38 45        27B                EXT REFS  NOT INNER
   33  1         IZ          40 45         6B       INSTACK
   46  3         IM          53 56        24B                EXT REFS  NOT INNER
   55            I           56 56        11B                EXT REFS
  100  5         I           66 119       76B                EXT REFS  NOT INNER
  114  6         J           70 75        10B          OPT
  133  7         K           77 84        13B          OPT
  207  19        I          122 193      114B                EXT REFS  NOT INNER
  223  20        J          126 131       10B          OPT
  242  21        K          133 140       13B          OPT

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMAX        41                 0 LC       (40)             40 BR      (1)
       FLUTVX        7                 0 VL       (1)               1 VH      (1)                  2 FLO     (1)
                                       3 FHI      (1)               4 IE      (1)                  5 NQZ     (1)
                                       6 NVTOT    (1)
       CIAPES       50                 0 ITAPES   (50)
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      CTSHF          2               0 LTSHF  (1)           1 TSHF   (1)
      CALCPX        51               0 TITLE1 (18)         18 TITLE2 (18)         36 DUB    (1)
                                    37 FUB    (1)          38 VUB    (1)          39 DLB    (1)
                                    40 FLB    (1)          41 VLB    (1)          42 IPLOT  (1)
                                    43 LSD    (1)          44 DSCALE (1)          45 FSCALE (1)
                                    46 VSCALE (1)          47 DPLEN  (1)          48 FRLEN  (1)
                                    49 VLEN   (1)          50 XDT    (1)

STATISTICS
  PROGRAM LENGTH               31342B   13026
  CM LABELED COMMON LENGTH       227B     151
        52000B CM USED
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```
      COMMON /CTSH  / KTSH  ,LTSH  ,TSH                              AFOM   59
      COMMON /CTSHFO/ LTSHFO,TSHFO                                   AFOM   60
      COMMON /CONSTS/ NO    ,YES                                     AFOM   61
      COMMON /CFMTA / FMTA                                           AFOM   62
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                           AFOM   63
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMC,KLUBAL,MSADD,NPASS,IDNOPT,  AFOM   64
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, AFOM   65
     2              IFIN,KLUB,KLUQ,MORBAL,CBAL                       AFOM   66
      COMMON /PLUG/ EMP(3,3),PHP(3,40)                               AFOM   67
      COMMON /KLUFF/ KFREE                                           AFOM   68
      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI      AFOM   69
     1                ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF     AFOM   70
     2                ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT           AFOM   71
     3                ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT  AFOM   72
      COMMON/PLACES/  IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4,  AFOM   73
     1                IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,     AFOM   74
     2                IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,   AFOM   75
     3                IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,               AFOM   76
     4                IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,     AFOM   77
     5                IUDESI,IFDESI,IUWTI,IFWTI,                     AFOM   78
     6                IUMEMO,IFMEMO,IUBT,IFBT,                       AFOM   79
     7                IUDESN,IFDESN,IUMD,IFMD,                       AFOM   80
     8                IUMEMF,IFMEMF,                                 AFOM   81
     9                IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,  AFOM   82
     A                IUDESF,IFDESF,IUWT,IFWT,                       AFOM   83
     B                IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,     AFOM   84
     C                IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,  AFOM   85
     D                IUBR,IFBR,                                     AFOM   86
     E                IUPHTF,IFPHTF,IUMODM,IFMODM,                   AFOM   87
     F                IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,   AFOM   88
     G                IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK          AFOM   89
      COMMON /FLUT/ UMOD(40),VMOD(40),VF,WW,CSCL,NMODE,IDMODE(40)    AFOM   90
      COMMON/COLS/ IT,IMINT,IMAXT,IDENS,IOLDT,IOLDW,ISRAT,IMINTO,    AFOM   91
     A             IINITT,IWPUT,                                     AFOM   92
     1             NVAR,JWPUT,JINITT,JMINT,JMAXT,JOLDT,JNEWT,JDRV,   AFOM   93
     2             JDRVO,JSPR1,JSPR2,JSPR3                           AFOM   94
      COMMON /FILE  / IPOS                                           AFOM   95
      COMMON/WAYTS/ WINITT,WST,WMB,WBOTH,WPRES,DW                    AFOM   96
      COMMON /CORE  / KORE  ,KOREDP                                  AFOM   97
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE   AFOM   98
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                   AFOM   99
      COMMON /CLUFO/ LKLUFO,KLUFO(20)                                AFOM  100
      COMMON /STORES/ NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)  AFOM  101
     A                ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)  AFOM  102
     B                ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)   AFOM  103
     C                ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)   AFOM  104
     D                ,STRRDO(5,3),STRRDN(5,3),SCALE(5,7)            AFOM  105
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD   AFOM  106
      COMMON /LOCSTR/ IUSTRI,IFSTRI,IUMREF,IFMREF                    AFOM  107
     1                ,IUMOD,IFMOD                                   AFOM  108
      COMMON /FITR/ NOMI,NIND(40)                                    AFOM  109
      COMMON /QELIM/ QDW,VQDW,LC38                                   AFOM  110
C                                                                    AFOM  111
C     ****************************************************          AFOM  112
C     *      THE FOLLOWING LINES OF FASTOP CODE HAVE      *          AFOM  113
C     *      BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *          AFOM  114
C     *      USED IN THE CURRENT VERSION OF ESP           *          AFOM  115
```

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      C                                                                       AFOM       2
      C45700, SUB. AFOM (AUTOMATED FLUTTER OPTIMIZATION MODULE)               AFOM       3
      C                                                                       AFOM       4
      C                                                                      *AFOM       5
      C***********************************************************************AFOM       6
      C***********************************************************************AFOM       7
      C***********************************************************************AFOM       8
      C***********************************************************************AFOM       9
      C***********************************************************************AFOM      10
      C*****                                                            ******AFOM      11
      C*****                   AAA    FFFFF    OOO    M   M             ******AFOM      12
      C*****                  A   A   F       O   O   MM MM             ******AFOM      13
      C*****                  AAAAA - FFFF  - O   O - M M M             ******AFOM      14
      C*****                  A   A   F       O   O   M M M             ******AFOM      15
      C*****                  A   A   F        OOO    M M M             ******AFOM      16
      C*****                                                            ******AFOM      17
      C***********************************************************************AFOM      18
      C***********************************************************************AFOM      19
      C***********************************************************************AFOM      20
      C***********************************************************************AFOM      21
      C***********************************************************************AFOM      22
      C                                                                      *AFOM      23
      C                                                                      *AFOM      24
            SUBROUTINE AFOM (KWIT)                                            AFOM      25
      C                                                                       AFOM      26
            INTEGER YES                                                       AFOM      27
      C                                                                       AFOM      28
            COMPLEX UMOD,VMOD                                                 AFOM      29
      C                                                                       AFOM      30
            DIMENSION FMTA(1)                                                 AFOM      31
            DIMENSION WORK(4000)                                              AFOM      32
      C  ***************************************************                  AFOM      33
      C  *     THE DIMENSION OF 'WORK' HAS BEEN REDUCED     *                  AFOM      34
      C  *     FROM 24000 IN FASTOP BECAUSE PORTIONS OF     *                  AFOM      35
      C  *     CODE NOT USED IN THE CURRENT VERSION OF      *                  AFOM      36
      C  *     ESP HAVE BEEN COMMENTED OUT.                 *                  AFOM      37
      C  ***************************************************                  AFOM      38
            DIMENSION BUFFER(210)                                             AFOM      39
            DIMENSION IPOS(20)                                                AFOM      40
            DIMENSION NAME1(2),NAME2(2),NAMPH(2),NAMPHT(2),NAMQ(2),NAMQT(2)   AFOM      41
            DIMENSION ALLM(40),ALLK(40)                                       AFOM      42
      C  ***************************************************                  AFOM      43
      C  *     THE FOLLOWING LINE OF FASTOP CODE HAS        *                  AFOM      44
      C  *     BEEN COMMENTED OUT BECAUSE IT IS NOT         *                  AFOM      45
      C  *     USED IN THE CURRENT VERSION OF ESP.          *                  AFOM      46
      C  ***************************************************                  AFOM      47
      C     DIMENSION ELAM(6000,3),NAMAB(2,2),NAMABT(2,2)                     AFOM      48
            DIMENSION TSH(1)            ,TSHFO(1)                             AFOM      49
            DIMENSION PHPTMP(40)                                              AFOM      50
      C                                                                       AFOM      51
      C  ***************************************************                  AFOM      52
      C  *     THE FOLLOWING LINE OF FASTOP CODE HAS        *                  AFOM      53
      C  *     BEEN COMMENTED OUT BECAUSE IT IS NOT         *                  AFOM      54
      C  *     USED IN THE CURRENT VERSION OF ESP.          *                  AFOM      55
      C  ***************************************************                  AFOM      56
      C     EQUIVALENCE (WORK(1),ELAM(1,1))                                   AFOM      57
      C                                                                       AFOM      58
```

```
VARIABLES      SN  TYPE            RELOCATION
    0  VDIS        REAL                F.P.       REFS       72    DEFINED      1
   51  VLB         REAL              CALCPX       REFS        5       12       14       73       75      126      128
   61  VLEN        REAL              CALCPX       REFS        5       12       14       73       75      126      128
    0  VOR         REAL                F.P.       REFS       71    DEFINED      1
   56  VSCALE      REAL              CALCPX       REFS        5       12       14       73       75      126      128
   46  VUB         REAL              CALCPX       REFS        5
   62  XDT         REAL              CALCPX       REFS        5       16      130

EXTERNALS               TYPE    ARGS      REFERENCES
       AXIS                       10           11       12       14       16       71       72       73       75      125
                                              126      128      130
       NUMBER                      6           49       59      101      113
       SYMBOL                      6           26       36       46       56       67       86       87       97      109
                                              121

STATEMENT LABELS                  DEF LINE    REFERENCES
  155   10                          131          17       77
   15   11                           11           9
   30   12                           18           9
  104   13                           86           9

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CALCPX       51                 0 TITLE1 (18)         18 TITLE2 (18)         36 DUB     (1)
                                      37 FUB    (1)          38 VUB    (1)          39 DLB     (1)
                                      40 FLB    (1)          41 VLB    (1)          42 IPLOT   (1)
                                      43 LSD    (1)          44 DSCALE (1)          45 FSCALE  (1)
                                      46 VSCALE (1)          47 DPLEN  (1)          48 FRLEN   (1)
                                      49 VLEN   (1)          50 XDT    (1)

STATISTICS
  PROGRAM LENGTH                    634B      412
  CM LABELED COMMON LENGTH           63B       51
          52000B CM USED
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      C                                                                   TIPL   116
      CIBM                                                                TIPL   117
      C     CALL SYMBL4 (ACE,8.95,.1,22HFREQUENCY VS. VELOCITY,.0,22)     TIPL   118
      CIBM                                                                TIPL   119
      C                                                                   TIPL   120
      CCDC                                                                TIPL   121
            CALL SYMBOL(ACE,8.95,.1,22HFREQUENCY VS. VELOCITY,.0,22)      TIPL   122
      CCDC                                                                TIPL   123
      C                                                                   TIPL   124
      C     DRAW AXES              ------------------------------         TIPL   125
            CALL AXIS (DSV,.0,9HFREQ.,HZ.,9,FRLEN,90.,.0,FSCALE,0,1)      TIPL   126
            IF (IPLOT.NE.0) CALL AXIS(DSV,.0,15HVEL.(TRUE),KTS.,15,VLEN,.0,.0, TIPL   127
           1VSCALE,0,1)                                                   TIPL   128
            IF (IPLOT.EQ.0) CALL AXIS (DSV,.0,17HVEL.(EQUIV.),KTS.,17,VLEN,.0, TIPL   129
           1.0,VSCALE,0,1)                                                TIPL   130
            CALL AXIS (XDT,.0,1H ,1,FRLEN,90.,.0,1.,3,1)                  TIPL   131
         10 RETURN                                                        TIPL   132
            END                                                           TIPL   133
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

```
    9    I            AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  TIPL            1        131

VARIABLES      SN  TYPE          RELOCATION
  553  ACE         REAL                          REFS       26      29      36      39      46      49      56
                                                   59       60      67      97     101     109     113     121
                                                 DEFINED    18      29      39      60      90     100     102
                                                  112      114
    0  ACH         REAL                 F.P.     REFS       49     101  DEFINED      1
   47  DLB         REAL               CALCPX     REFS        5
   57  DPLEN       REAL               CALCPX     REFS        5
   54  DSCALE      REAL               CALCPX     REFS        5
    0  DSV         REAL                 F.P.     REFS       73      75      86      87      90     100     102
                                                  112      114     125     126     128  DEFINED      1
   44  DUB         REAL               CALCPX     REFS        5
   50  FLB         REAL               CALCPX     REFS        5
    0  FORG        REAL                 F.P.     REFS       18      71      72  DEFINED      1
   60  FRLEN       REAL               CALCPX     REFS        5      11      16      71      72     125     130
   55  FSCALE      REAL               CALCPX     REFS        5      11      71     125
   45  FUB         REAL               CALCPX     REFS        5
   52  IPLOT       INTEGER            CALCPX     REFS        5      12      14      73      75     126     128
   53  LSD         INTEGER            CALCPX     REFS        5       9
    0  RHO         REAL                 F.P.     REFS       59     113  DEFINED      1
    0  TITLE1      REAL       ARRAY   CALCPX     REFS        3       5      26      86
   22  TITLE2      REAL       ARRAY   CALCPX     REFS        3       5      36      87
```

```
C
      CALL NUMBER (ACE,4.6,.1,RHO,90.,3)
      ACE     =  ACE + .15
C
CIBM
C     CALL SYMBL4 (ACE,.25,.1,22HFREQUENCY VS. VELOCITY,90.,22)
CIBM
C
CCDC
      CALL SYMBOL(ACE,.25,.1,22HFREQUENCY VS. VELOCITY,90.,22)
CCDC
C
C     DRAW AXES              ------------------------------
      CALL AXIS (FORG,.0,9HFREQ.,HZ.,9,FRLEN,.0,VOR,-FSCALE,0,-1)
      CALL AXIS (FORG,VDIS,1H ,1,FRLEN,.0,.0,1.,3,1)
      IF (IPLOT.NE.0) CALL AXIS (DSV,.0,15HVEL.(TRUE),KTS.,15,VLEN,90.,
     1.0,VSCALE,4,1)
      IF (IPLOT.EQ.0) CALL AXIS (DSV,.0,17HVEL.(EQUIV.),KTS.,17,VLEN,
     190.,.0,VSCALE,4,1)
     GO TO 10
C     WRITE TITLES           ------------------------------
C
CIBM
C  13 CALL SYMBL4 (DSV,9.4,.1,TITLE1,.0,72)
C     CALL SYMBL4 (DSV,9.25,.1,TITLE2,.0,72)
CIBM
C
CCDC
   13 CALL SYMBOL(DSV,9.4,.1,TITLE1,.0,72)
      CALL SYMBOL(DSV,9.25,.1,TITLE2,.0,72)
CCDC
C
      ACE     =  DSV + .25
C
CIBM
C     CALL SYMBL4 (ACE,9.1,.1,9HMACH NO.=,.0,9)
CIBM
C
CCDC
      CALL SYMBOL(ACE,9.1,.1,9HMACH NO.=,.0,9)
CCDC
C
      ACE     =  DSV + 1.
      CALL NUMBER (ACE,9.1,.1,ACH,.0,3)
      ACE     =  DSV + 3.25
C
CIBM
C     CALL SYMBL4 (ACE,9.1,.1,14HDENSITY RATIO=,.0,14)
CIBM
C
CCDC
      CALL SYMBOL(ACE,9.1,.1,14HDENSITY RATIO=,.0,14)
CCDC
C
      ACE     =  DSV + 4.6
      CALL NUMBER (ACE,9.1,.1,RHO,.0,3)
      ACE     =  DSV + .25
```

```
      SUBROUTINE TIPL (FORG,VOR,ACH,RHO,DSV,VDIS)
C
      DIMENSION     TITLE1(18), TITLE2(18)
C
      COMMON /CALCPX/ TITLE1,TITLE2,DUB,FUB,VUB,DLB,
     1   FLB, VLB, IPLOT, LSD, DSCALE, FSCALE, VSCALE, DPLEN,
     2   FRLEN,  VLEN, XDT
C     FREQUENCY PLOT ORDERING -----------------------------
      GO TO ( 11 , 12 , 13 ) , LSD
C     DRAW AXES             -----------------------------
   11 CALL AXIS (.O,.O,9HFREQ.,HZ.,9,FRLEN,90.,.O,FSCALE,O,1)
      IF (IPLOT.NE.O) CALL AXIS (.O,.O,15HVEL.(TRUE),KTS.,15,VLEN,.O,.O,
     1VSCALE,O,1)
      IF (IPLOT.EQ.O) CALL AXIS (.O,.O,17HVEL.(EQUIV.),KTS.,17,VLEN,.O,
     1.O,VSCALE,O,1)
      CALL AXIS (XDT,.O,1H ,1,FRLEN,90.,.O,1.,3,1)
      GO TO 10
   12 ACE      =  FORG - 1.O
C     WRITE TITLES          -----------------------------
C
CIBM
C     CALL SYMBL4 (ACE,.O,.1,TITLE1,90.,72)
CIBM
C
CCDC
      CALL SYMBOL(ACE,.O,.1,TITLE1,90.,72)
CCDC
C
      ACE      =  ACE + .15
C
CIBM
C     CALL SYMBL4 (ACE,.O,.1,TITLE2,90.,72)
CIBM
C
CCDC
      CALL SYMBOL(ACE,.O,.1,TITLE2,90.,72)
CCDC
C
      ACE      =  ACE + .15
C
CIBM
C     CALL SYMBL4 (ACE,.25,.1,9HMACH NO.=,90.,9)
CIBM
C
CCDC
      CALL SYMBOL(ACE,.25,.1,9HMACH NO.=,90.,9)
CCDC
C
      CALL NUMBER (ACE,1.,.1,ACH,90.,3)
C
CIBM
C     CALL SYMBL4 (ACE,3.25,.1,14HDENSITY RATIO=,90.,14)
CIBM
C
CCDC
      CALL SYMBOL(ACE,3.25,.1,14HDENSITY,RATIO=,90.,14)
CCDC
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  202  50                         69         2*68
  224  60                         78          68
  170  61                         67          77
  246  80                         91          23          68

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
  127  20         I          52 60        22B                 EXT REFS
  203  30         I          70 76        21B                 EXT REFS

STATISTICS
  PROGRAM LENGTH                  354B        236
          52000B CM USED
```

```
VARIABLES      SN  TYPE          RELOCATION
                                                DEFINED      8
  324   CTETA      REAL                            REFS     72        88   DEFINED        12        13
    0   DY         REAL               F.P.         REFS     23        42        71   DEFINED         1
  325   EN         REAL                            REFS     62        63   DEFINED        14
  350   I          INTEGER                      DEFINED     52        70
  347   I3         INTEGER                         REFS     53   DEFINED        47        60
    0   KIND       INTEGER            F.P.         REFS     10      2*11      2*23        24   DEFINED         1        11
    0   KOSB       INTEGER            F.P.         REFS      8   DEFINED         1
  333   LL         INTEGER                         REFS     67        68   DEFINED        24        67
  334   N          INTEGER                         REFS     52        66        70   DEFINED        25        66
    0   NC         INTEGER            F.P.         REFS     18        79        88   DEFINED         1
  346   N1         INTEGER                         REFS     49        72   DEFINED        45        49
    0   SIZE       REAL               F.P.         REFS     17        25   DEFINED         1
  337   TH         REAL                            REFS     35        36   DEFINED        34
    0   THETA      REAL               F.P.         REFS     12        13        26        30        34
                                                DEFINED      1
  345   VALUE      REAL                            REFS     43        44        48        50        72
                                                DEFINED     42        46        50        71        79
    0   X          REAL               F.P.         REFS     37        38        80   DEFINED         1
  340   XA         REAL                            REFS     53        57        61        62        72        73
                                                DEFINED     37        57        62        73
  335   XB         REAL                            REFS     39        55        57        62        63        64        73
                                                     75     80        81   DEFINED        27        31        36
  341   XC         REAL                            REFS     54        55        59        64        71        75        88
                                                DEFINED     38        55        64        75        80
    0   Y          REAL               F.P.         REFS     39        40        81   DEFINED         1
  342   YA         REAL                            REFS     53        58        61        63        72        74
                                                DEFINED     39        58        63        74
  336   YB         REAL                            REFS     37        56        58        62        63        65        74
                                                     76     80        81   DEFINED        28        32        35
  343   YC         REAL                            REFS     54        56        59        65        71        76        88
                                                DEFINED     40        56        65        76        81
    0   YMIN       REAL               F.P.         REFS     41        42        71   DEFINED         1

EXTERNALS            TYPE    ARGS          REFERENCES
        COS          REAL       1 LIBRARY        36
        NUMBER                  6                72
        PLOT                    3                53        54        59        61
        SIN          REAL       1 LIBRARY        35
        SYMBOL                  6                88

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE   REFERENCES
        ABS          REAL       1  INTRIN                  41        42

STATEMENT LABELS                  DEF LINE    REFERENCES
    0   1           INACTIVE         27          26
   64   2                            30          26
   77   3                            37          29        33
    0   4           INACTIVE         31          30
    0   5           INACTIVE         44          43
  116   6                            45        2*43
   71   7                            34          26      2*30
  121   14                           48          51
    0   15          INACTIVE         49          48
  126   16                           52        2*48
    0   20                           60          52
    0   30                           76          70
```

```
      YA = YA + YB                                          AXIS      59
      CALL PLOT (XC,YC,+2)                                  AXIS      60
   20 I3 = 2                                                AXIS      61
      CALL PLOT (XA,YA,+2)                                  AXIS      62
      XA = XA - XB*CEN + YB*(EN + BEN)                      AXIS      63
      YA = YA - YB*CEN + XB*(EN - BEN)                      AXIS      64
      XC = XC * XB                                          AXIS      65
      YC = YC * YB                                          AXIS      66
      N  = N + 1                                            AXIS      67
   61 LL = LL + 1                                           AXIS      68
      GO TO (50,60,50,80),LL                                AXIS      69
   50 CONTINUE                                              AXIS      70
      DO 30 I = 1,N                                         AXIS      71
      VALUE = ((XC+YC)*DY) + YMIN                           AXIS      72
      CALL NUMBER (XA,YA,0.10,VALUE,CTETA,N1)               AXIS      73
      XA = XA - XB                                          AXIS      74
      YA = YA - YB                                          AXIS      75
      XC = XC - XB                                          AXIS      76
   30 YC = YC - YB                                          AXIS      77
      GO TO 61                                              AXIS      78
   60 CONTINUE                                              AXIS      79
      VALUE = NC / 2                                        AXIS      80
      XC = X  + XB*(APB-APN) - YB*AND*(.37-APP)             AXIS      81
      YC = Y  + YB*(APB-APN) - XB*AND*(.37+APP)             AXIS      82
C                                                           AXIS      83
CIBM                                                        AXIS      84
C     CALL SYMBL4 (XC,YC,0.14,BCD,CTETA,NC)                 AXIS      85
CIBM                                                        AXIS      86
C                                                           AXIS      87
CCDC                                                        AXIS      88
      CALL SYMBOL(XC,YC,0.14,BCD,CTETA,NC)                  AXIS      89
CCDC                                                        AXIS      90
C                                                           AXIS      91
   80 CONTINUE                                              AXIS      92
      RETURN                                                AXIS      93
      END                                                   AXIS      94
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTR" POINTS      DEF LINE     REFERENCES
    3 AXIS            1           92

VARIABLES     SN  TYPE        RELOCATION
  323  AND        REAL                         REFS      14     20      37      39     80     81
                                            DEFINED       9     10
  330  APB        REAL                         REFS      80     81  DEFINED     17
  331  APN        REAL                         REFS      19     80      81  DEFINED    18     19
  332  APP        REAL                         REFS      80     81  DEFINED     20
    0  BCD        REAL       ARRAY    F.P.     REFS       3     88  DEFINED      1
  326  BEN        REAL                         REFS      62     63  DEFINED     15
  327  CEN        REAL                         REFS      62     63  DEFINED     16
  344  CHAR       REAL                         REFS      43     48  DEFINED     41     44
  322  COSB       REAL                         REFS      12     13      15      16     19     20
```

```
      SUBROUTINE AXIS (X,Y,BCD,NC,SIZE,THETA,YMIN,DY,KIND,KOSB)          AXIS    2
C                                                                        AXIS    3
      DIMENSION BCD(1)                                                   AXIS    4
C                                                                        AXIS    5
C     MODIFIED TO PLOT LEGENDS ON EITHER SIDE OF AXIS                    AXIS    6
C     NEGATIVE SIGN CHANGES POSITION                                     AXIS    7
C                                                                        AXIS    8
      COSB = KOSB                                                        AXIS    9
      AND = 1.0                                                          AXIS   10
      IF (KIND.GT.3) AND = -1.0                                          AXIS   11
      IF (KIND.GT.3) KIND = KIND - 4                                     AXIS   12
      IF (COSB.EQ.1.0) CTETA = THETA                                     AXIS   13
      IF (COSB.EQ.-1.0) CTETA = THETA + 180.0                            AXIS   14
      EN = -.07 * AND                                                    AXIS   15
      BEN = .05 * COSB                                                   AXIS   16
      CEN = .12 * COSB                                                   AXIS   17
      APB = SIZE / 2.0                                                   AXIS   18
      APN = NC / 2                                                       AXIS   19
      APN = APN * .12 * COSB                                             AXIS   20
      APP = AND * COSB * .09                                             AXIS   21
C                                                                        AXIS   22
C                                                                        AXIS   23
      IF  (DY.EQ.0.0.AND.(KIND.EQ.0.OR.KIND.EQ.2))  GO TO 80             AXIS   24
      LL = KIND                                                          AXIS   25
      N = SIZE + 0.50                                                    AXIS   26
      IF (THETA - 0.0) 7,1,2                                             AXIS   27
    1 XB = 1.0                                                           AXIS   28
      YB = 0.0                                                           AXIS   29
      GO TO 3                                                            AXIS   30
    2 IF (THETA - 90.0) 7,4,7                                            AXIS   31
    4 XB = 0.0                                                           AXIS   32
      YB = 1.0                                                           AXIS   33
      GO TO 3                                                            AXIS   34
    7 TH = THETA / 57.29578                                              AXIS   35
      YB = SIN (TH)                                                      AXIS   36
      XB = COS (TH)                                                      AXIS   37
    3 XA = X - 0.1 * YB * AND                                            AXIS   38
      XC  = X                                                            AXIS   39
      YA = Y - 0.1 * XB * AND                                            AXIS   40
      YC = Y                                                             AXIS   41
      CHAR = ABS (YMIN)                                                  AXIS   42
      VALUE = ABS (YMIN + DY)                                            AXIS   43
      IF (CHAR - VALUE) 5,6,6                                            AXIS   44
    5 CHAR = VALUE                                                       AXIS   45
    6 N1 = +0                                                            AXIS   46
      VALUE = 100.0                                                      AXIS   47
      I3 = 3                                                             AXIS   48
   14 IF (CHAR - VALUE) 15,16,16                                         AXIS   49
   15 N1 = N1 + 1                                                        AXIS   50
      VALUE = VALUE / 10.0                                               AXIS   51
      GO TO 14                                                           AXIS   52
   16 DO 20 I = 1,N                                                      AXIS   53
      CALL PLOT (XA,YA,+I3)                                              AXIS   54
      CALL PLOT (XC,YC,+2)                                               AXIS   55
      XC = XC + XB                                                       AXIS   56
      YC = YC + YB                                                       AXIS   57
      XA = XA + XB                                                       AXIS   58
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  177  4                          108          37         70

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CALCPX        51                  0 TITLE1 (18)        18 TITLE2 (18)        36 DUB     (1)
                                        37 FUB    (1)         38 VUB    (1)         39 DLB     (1)
                                        40 FLB    (1)         41 VLB    (1)         42 IPLOT   (1)
                                        43 LSD    (1)         44 DSCALE (1)         45 FSCALE  (1)
                                        46 VSCALE (1)         47 DPLEN  (1)         48 FRLEN   (1)
                                        49 VLEN   (1)         50 XDT    (1)

STATISTICS
  PROGRAM LENGTH                  723B      467
  CM LABELED COMMON LENGTH         63B       51
          52000B CM USED
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

      9     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.


        SYMBOLIC REFERENCE MAP (R=3)

  ENTRY POINTS      DEF LINE      REFERENCES
      3   AXPL           1          108

  VARIABLES       SN  TYPE             RELOCATION
      0   ACH         REAL                 F.P.       REFS       32       60       93   DEFINED        1
     47   DLB         REAL                CALCPX      REFS        6       10       39       71
      0   DMPORI      REAL                 F.P.       REFS       11       14       39       41       68       72      100
                                                   DEFINED        1       10       38       71
      0   DMPZER      REAL                 F.P.       REFS       15       69      106   DEFINED        1       11       41
                                                         72
     57   DPLEN       REAL                CALCPX      REFS        6       15       16       67       69      105      106
     54   DSCALE      REAL                CALCPX      REFS        6       10       11       15       38       39       41
                                                         69       71       72      106
      0   DSTART      REAL                 F.P.       REFS       15       16  DEFINED        1       12
      0   DSV         REAL                 F.P.       REFS       42  DEFINED        1       40       74      107
     44   DUB         REAL                CALCPX      REFS        6       38
     50   FLB         REAL                CALCPX      REFS        6
      0   FORG        REAL                 F.P.       REFS       40  DEFINED        1       39
     60   FRLEN       REAL                CALCPX      REFS        6       10       12       40
     55   FSCALE      REAL                CALCPX      REFS        6       42
     45   FUB         REAL                CALCPX      REFS        6
     52   IPLOT       INTEGER             CALCPX      REFS        6      101      103
     53   LSD         INTEGER             CALCPX      REFS        6        9
      0   RHO         REAL                 F.P.       REFS       34       62       95   DEFINED        1
      0   TITLE1      REAL       ARRAY    CALCPX      REFS        4        6       29       57       90
     22   TITLE2      REAL       ARRAY    CALCPX      REFS        4        6       30       58       91
      0   VDIS        REAL                 F.P.       REFS       67       74      105   DEFINED        1       43       73
     51   VLB         REAL                CALCPX      REFS        6
     61   VLEN        REAL                CALCPX      REFS        6       14       43       68       73      100      101
                                                        103
      0   VOR         REAL                 F.P.    DEFINED        1       42       75
     56   VSCALE      REAL                CALCPX      REFS        6       14      100      101      103
     46   VUB         REAL                CALCPX      REFS        6
      0   XDNP        REAL                 F.P.    DEFINED        1       76
     62   XDT         REAL                CALCPX      REFS        6       16       76

  EXTERNALS             TYPE    ARGS        REFERENCES
          AXIS                    10            14       15       16       67       68       69      100      101      103
                                               105      106
          NUMBER                   6            32       34       60       62       93       95
          SYMBOL                   6            29       30       31       33       57       58       59       61       63
                                                90       91       92       94       96

  STATEMENT LABELS          DEF LINE     REFERENCES
     15   1                    10           9
     54   2                    38           9
    125   3                    71           9
```

```
            CALL SYMBOL(.25,.0,.1,TITLE2,90.,72)                          AXPL  59
            CALL SYMBOL(.4,.25,.1,9HMACH NO.=,90.,9)                      AXPL  60
            CALL NUMBER(.65,1.,.1,ACH,90.,3)                              AXPL  61
            CALL SYMBOL(.4,3.25,.1,14HDENSITY RATIO=,90.,14)              AXPL  62
            CALL NUMBER(.65,4.6,.1,RHO,90.,3)                             AXPL  63
            CALL SYMBOL(.55,.25,.1,20HDAMPING VS. VELOCITY,90.,20)        AXPL  64
      CCDC                                                                AXPL  65
      C                                                                   AXPL  66
      C     DRAW AXES          ------------------------------             AXPL  67
            CALL AXIS (1.0,VDIS,1H ,1,DPLEN,.0,.0,1.,3,1)                 AXPL  68
            CALL AXIS (DMPORI,.0,1H ,1,VLEN,90.,.0,1.,7,1)                AXPL  69
            CALL AXIS (1.,.0,9HDAMPING,G,9,DPLEN,.0,DMPZER,-DSCALE,0,-1)  AXPL  70
            GO TO 4                                                       AXPL  71
          3 DMPORI   = -DLB / DSCALE                                      AXPL  72
            DMPZER   = -DMPORI * DSCALE                                   AXPL  73
            VDIS     =  VLEN + 0.5                                        AXPL  74
            DSV      =  VDIS + 1.5                                        AXPL  75
            VOR      = 0.0                                                AXPL  76
            XDNP     =  XDT + 1.5                                         AXPL  77
      C     WRITE TITLES       ------------------------------             AXPL  78
      C                                                                   AXPL  79
      CIBM                                                                AXPL  80
      C     CALL SYMBL4 (.0,9.4,.1,TITLE1,.0,72)                          AXPL  81
      C     CALL SYMBL4 (.0,9.25,.1,TITLE2,.0,72)                         AXPL  82
      C     CALL SYMBL4 (.25,9.1,.1,9HMACH NO.=,.0,9)                     AXPL  83
      C     CALL NUMBER (1.,9.1,.1,ACH,.0,3)                              AXPL  84
      C     CALL SYMBL4 (3.25,9.1,.1,14HDENSITY RATIO=,.0,14)             AXPL  85
      C     CALL NUMBER (4.6,9.1,.1,RHO,.0,3)                             AXPL  86
      C     CALL SYMBL4 (.25,8.95,.1,20HDAMPING VS. VELOCITY,.0,20)       AXPL  87
      CIBM                                                                AXPL  88
      C                                                                   AXPL  89
      CCDC                                                                AXPL  90
            CALL SYMBOL(.0,9.4,.1,TITLE1,.0,72)                           AXPL  91
            CALL SYMBOL(.0,9.25,.1,TITLE2,.0,72)                          AXPL  92
            CALL SYMBOL(.25,9.1,.1,9HMACH NO.=,.0,9)                      AXPL  93
            CALL NUMBER(1.25,9.1,.1,ACH,.0,3)                             AXPL  94
            CALL SYMBOL(3.25,9.1,.1,14HDENSITY RATIO=,.0,14)              AXPL  95
            CALL NUMBER(4.85,9.1,.1,RHO,.0,3)                             AXPL  96
            CALL SYMBOL(.25,8.95,.1,20HDAMPING VS. VELOCITY,.0,20)        AXPL  97
      CCDC                                                                AXPL  98
      C                                                                   AXPL  99
      C     DRAW AXES          ------------------------------             AXPL 100
            CALL AXIS (.0,DMPORI,1H ,1,VLEN,.0,.0,VSCALE,3,1)             AXPL 101
            IF (IPLOT .NE. 0) CALL AXIS (.0,.0,15HVEL.(TRUE),KTS.,15,VLEN,.0, AXPL 102
           1.0,VSCALE,0,1)                                                AXPL 103
            IF (IPLOT.EQ.0) CALL AXIS (.0,.0,17HVEL.(EQUIV.),KTS.,17,VLEN,.0, AXPL 104
           1.0,VSCALE,0,1)                                                AXPL 105
            CALL AXIS (VDIS,.0,1H ,1,DPLEN,90.,.0,1.,3,1)                 AXPL 106
            CALL AXIS (.0,.0,9HDAMPING,G,9,DPLEN,90.,DMPZER,DSCALE,0,1)   AXPL 107
            DSV      =  0.0                                               AXPL 108
          4 RETURN                                                        AXPL 109
            END                                                           AXPL 110
```

```
         SUBROUTINE AXPL (DMPORI,DMPZER,DSTART,FORG,DSV,VOR,VDIS,           AXPL      2
        1              XDNP,ACH,RHO)                                        AXPL      3
      C                                                                     AXPL      4
         DIMENSION     TITLE1(18), TITLE2(18)                               AXPL      5
      C                                                                     AXPL      6
         COMMON /CALCPX/ TITLE1,TITLE2,DUB,FUB,VUB,DLB,                     AXPL      7
        1   FLB, VLB, IPLOT, LSD, DSCALE, FSCALE, VSCALE, DPLEN,            AXPL      8
        2   FRLEN,  VLEN, XDT                                               AXPL      9
         GO TO ( 1 , 2 , 3 ) , LSD                                          AXPL     10
       1 DMPORI   =  FRLEN + 0.5 - DLB / DSCALE                             AXPL     11
         DMPZER   = -DMPORI * DSCALE                                        AXPL     12
         DSTART   =  FRLEN + 0.5                                            AXPL     13
      C  DRAW AXES            ------------------------------                AXPL     14
         CALL AXIS (0.0,DMPORI,1H ,1,VLEN,0.0,0.0,VSCALE,3,1)               AXPL     15
         CALL AXIS (0.0,DSTART,9HDAMPING,G,9,DPLEN,90.0,DMPZER,DSCALE,0,1)  AXPL     16
         CALL AXIS (XDT,DSTART,1H ,1,DPLEN,90.0,0.0,1.0,3,1)                AXPL     17
      C  WRITE TITLES         ------------------------------                AXPL     18
      C                                                                     AXPL     19
      CIBM                                                                  AXPL     20
      C  CALL SYMBL4(0.0,9.15,.1,TITLE1,0.0,72)                             AXPL     21
      C  CALL SYMBL4(0.0,9.00,.1,TITLE2,0.0,72)                             AXPL     22
      C  CALL SYMBL4(.25,8.85,.1,9HMACH NO.=,0.0,9)                         AXPL     23
      C  CALL NUMBER(1.0,8.85,.1,ACH,0.0,3)                                 AXPL     24
      C  CALL SYMBL4(3.25,8.85,.1,14HDENSITY RATIO=,0.0,14)                 AXPL     25
      C  CALL NUMBER(4.6,8.85,.1,RHO,0.0,3)                                 AXPL     26
      CIBM                                                                  AXPL     27
      C                                                                     AXPL     28
      CCDC                                                                  AXPL     29
         CALL SYMBOL(0.0,9.15,.1,TITLE1,0.0,72)                             AXPL     30
         CALL SYMBOL(0.0,9.00,.1,TITLE2,0.0,72)                             AXPL     31
         CALL SYMBOL(.25,8.85,.1,9HMACH NO.=,0.0,9)                         AXPL     32
         CALL NUMBER(1.25,8.85,.1,ACH,0.0,3)                                AXPL     33
         CALL SYMBOL(3.25,8.85,.1,14HDENSITY RATIO=,0.0,14)                 AXPL     34
         CALL NUMBER(4.85,8.85,.1,RHO,0.0,3)                                AXPL     35
      CCDC                                                                  AXPL     36
      C                                                                     AXPL     37
         GO TO 4                                                            AXPL     38
       2 DMPORI   =  1.0 + DUB / DSCALE                                     AXPL     39
         FORG     =  DMPORI - DLB / DSCALE + 2.0                            AXPL     40
         DSV      =  FORG + FRLEN                                           AXPL     41
         DMPZER   =  DMPORI * DSCALE                                        AXPL     42
         VOR      =  DSV * FSCALE                                           AXPL     43
         VDIS     =  VLEN + 0.5                                             AXPL     44
      C  WRITE TITLES         ------------------------------                AXPL     45
      C                                                                     AXPL     46
      CIBM                                                                  AXPL     47
      C  CALL SYMBL4 (.1,.0,.1,TITLE1,90.,72)                               AXPL     48
      C  CALL SYMBL4 (.25,.0,.1,TITLE2,90.,72)                              AXPL     49
      C  CALL SYMBL4 (.4,.25,.1,9HMACH NO.=,90.,9)                          AXPL     50
      C  CALL NUMBER (.4,1.,.1,ACH,90.,3)                                   AXPL     51
      C  CALL SYMBL4 (.4,3.25,.1,14HDENSITY RATIO=,90.,14)                  AXPL     52
      C  CALL NUMBER (.4,4.6,.1,RHO,90.,3)                                  AXPL     53
      C  CALL SYMBL4 (.55,.25,.1,20HDAMPING VS. VELOCITY,90.,20)            AXPL     54
      CIBM                                                                  AXPL     55
      C                                                                     AXPL     56
      CCDC                                                                  AXPL     57
         CALL SYMBOL(.1,.0,.1,TITLE1,90.,72)                                AXPL     58
```

```
      C  ***************************************************         AFOM  116
      C     DATA NAMAB  /4HPHA ,4H    ,4HQA  ,4H    /                  AFOM  117
      C     DATA NAMABT /4HPHAT,4H    ,4HQAT ,4H    /                  AFOM  118
      C                                                                AFOM  119
            DATA NAMPH/4HPH  ,4H    /,      NAMPHT/4HPHT ,4H    /      AFOM  120
           1    ,NAMQ/4HQ   ,4H    /,      NAMQT/4HQT  ,4H    /        AFOM  121
      C                                                                AFOM  122
            KORE=4000                                                  AFOM  123
      C  ***************************************************         AFOM  124
      C  *       THE VALUE OF 'KORE' HAS BEEN REDUCED       *          AFOM  125
      C  *       FROM 24000 IN FASTOP BECAUSE PORTIONS OF   *          AFOM  126
      C  *       CODE NOT USED IN THE CURRENT VERSION OF    *          AFOM  127
      C  *       ESP HAVE BEEN COMMENTED OUT.               *          AFOM  128
      C  ***************************************************         AFOM  129
            KOREDP=KORE/2                                              AFOM  130
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS AFOM 131
            KOREDP=KORE                                                AFOM  132
      CCDC  ENDING OF PROGRAMS ASSOCIATED WITH CDC COMPUTER PROGRAMS   AFOM  133
      C                                                                AFOM  134
            LTSHR  =  LTSH                                             AFOM  135
            ICYCLE = 1                                                 AFOM  136
            IF (KTSH .EQ. YES) LTSHR = LTSH-2                          AFOM  137
      C                                                                AFOM  138
      C                                                                AFOM  139
      C PRINT TITLE FOR AUTOMATED FLUTTER OPTIMIZATION MODULE          AFOM  140
      C                                                                AFOM  141
            CALL TAFOM(1)                                              AFOM  142
      C                                                                AFOM  143
      C                                                                AFOM  144
            KOUNT=LINES                                                AFOM  145
            IF(NCYC.GT.0) GO TO 2                                      AFOM  146
            READ(ITAPER,9000) SOOOR                                    AFOM  147
            READ(ITAPER,FMTA) (TSHFO(L),L=1,LTSHR)                     AFOM  148
          2 CONTINUE                                                   AFOM  149
            DO 4 L=1,LTSH                                              AFOM  150
          4 TSH(L)=TSHFO(L)                                            AFOM  151
      C                                                                AFOM  152
            CALL PROGNA(4H(AFO,4HM  ))                                 AFOM  153
            CALL TITLES(2)                                             AFOM  154
            CALL MESAGE(1,4,4HAFOM)                                    AFOM  155
            CALL TIMEB(9,9HFROM AFOM)                                  AFOM  156
      C                                                                AFOM  157
            IF(NCYC.GT.0) GO TO 6                                      AFOM  158
      C                                                                AFOM  159
            NCC=10                                                     AFOM  160
            NKLUFO=LKLUFO                                              AFOM  161
            CALL CLUES(IUCD,NCC,NKLUFO,KLUFO)                          AFOM  162
            IF(KLUSE.NE.2) GO TO 6                                     AFOM  163
      C                                                                AFOM  164
            READ(IUCD,9001) VDES,EPS1,DWMAX                            AFOM  165
            READ(IUCD,9002) NBAR,NFIX                                  AFOM  166
            READ(IUCD,9001) D,DBAL,DEL,EPS2                            AFOM  167
      C                                                                AFOM  168
      C  ***************************************************         AFOM  169
      C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE    *          AFOM  170
      C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT    *          AFOM  171
      C  *       USED IN THE CURRENT VERSION OF ESP.        *          AFOM  172
```

```
C   ****************************************************              AFOM   173
C      BOT=VDES                                                       AFOM   174
C      TOP=(1.0+EPS1)*VDES                                            AFOM   175
C      WRITE(IUPR,9014)                                               AFOM   176
C      KOUNT=KOUNT+4                                                  AFOM   177
C      WRITE(IUPR,9003) VDES,BOT,TOP,DWMAX                            AFOM   178
C      KOUNT=KOUNT+9                                                  AFOM   179
C                                                                     AFOM   180
C      WRITE(IUPR,9004) NBAR,NFIX                                     AFOM   181
C      KOUNT=KOUNT+5                                                  AFOM   182
C                                                                     AFOM   183
C      SCUT=(1.0-D)*100.0                                             AFOM   184
C      BCUT=(1.0-DBAL)*100.0                                          AFOM   185
C      TEST=100.0*EPS2                                                AFOM   186
C      WRITE(IUPR,9005) SCUT,BCUT,DEL,TEST                            AFOM   187
C      KOUNT=KOUNT+8                                                  AFOM   188
C   ****************************************************              AFOM   189
C   *       END OF CODE THAT HAS BEEN COMMENTED OUT.      *           AFOM   190
C   ****************************************************              AFOM   191
C                                                                     AFOM   192
       NNN=NBAR                                                       AFOM   193
C                                                                     AFOM   194
     6 CONTINUE                                                       AFOM   195
C                                                                     AFOM   196
C ASSIGN ADDITIONAL UNITS AND FILES.                                  AFOM   197
C                                                                     AFOM   198
       CALL UNFIL(3)                                                  AFOM   199
C                                                                     AFOM   200
       CALL PROGNA(4H(AFO,4HM  ))                                     AFOM   201
C                                                                     AFOM   202
C                                                                     AFOM   203
C SELECT, FROM MODAL MATRIX PHTF, THOSE MODES WHICH WERE USED IN THE  AFOM   204
C FLUTTER ANALYSIS. ASSEMBLE THESE MODES INTO MODAL MATRIX PHT.       AFOM   205
C ALSO, SORT MODAL MASS,MODM, AND MODAL STIFFNESS,MODK, SO THAT THEY ARE AFOM 206
C COMPATIBLE WITH MODAL MATRIX PHT.                                   AFOM   207
C IF THIS IS A FREE-FREE ANALYSIS, SORT THE PLUG MODES.               AFOM   208
C                                                                     AFOM   209
C                                                                     AFOM   210
       CALL GEDLAB(8HAFOM  01,IUPHTF,NAME1,IFPHTF,KROW,KCOL)          AFOM   211
       NQZ = NMODE                                                    AFOM   212
       IF (LC38.EQ.1)  NQZ = NMODE - NOMI                             AFOM   213
       CALL PUDLAB(8HAFOM  01,IUPHT,NAMPHT,IFPHT,NQZ,KCOL)            AFOM   214
C                                                                     AFOM   215
       KS=1                                                           AFOM   216
       DO 20 I=1,NMODE                                                AFOM   217
       KF=IDMODE(I)                                                   AFOM   218
       DO 10 J=KS,KF                                                  AFOM   219
    10 CALL GETROW(IUPHTF,1,WORK,KCOL)                                AFOM   220
       KS=IDMODE(I)+1                                                 AFOM   221
       IF (LC38.NE.1.OR.NOMI.EQ.0)  GO TO 14                          AFOM   222
       DO 8 K=1,NOMI                                                  AFOM   223
       IF (NIND(K).EQ.I)  GO TO 20                                    AFOM   224
     8 CONTINUE                                                       AFOM   225
    14 CALL PUTROW(IUPHT,2,WORK,KCOL)                                 AFOM   226
    20 CONTINUE                                                       AFOM   227
C                                                                     AFOM   228
       CALL DCLOSE(IUPHTF)                                            AFOM   229
```

```
      CALL DCLOSE(IUPHT)
C
C
      IPOS(IUPHT)=IFPHT
      IPOS(IUMOD)=IFMOD
      IPOS(IUGO1)=IFS1
      IPOS(IUGO2)=IFS2
      JUNITF=IUPHT+1
      CALL TRAN(KORE,WORK,WORK,IUPHT,IUMOD,IUGO1,IUGO2,JUNITF,NAMPH)
      CALL PROGNA(4H(AFO,4HM  ))
C
C IF FREE-FREE, DO THE SAME ASSEMBLY FOR THE MODES IN ABSOLUTE COORD.
C
      IF(KFREE.EQ.1) GO TO 12
      CALL GEDLAB(8HAFOM  07,4,NAME1,2,KROW,KCOL)
      CALL PUDLAB(8HAFOM  07,3,NAMPHT,2,NQZ,KCOL)
      KS=1
      DO 21 I= 1,NMODE
      KF= IDMODE(I)
      DO 11 J= KS,KF
   11 CALL GETROW(4,1,WORK,KCOL)
      KS= IDMODE(I) + 1
      IF (LC38.NE.1.OR.NOMI.EQ.0)  GO TO 15
      DO 9 K=1,NOMI
      IF (NIND(K).EQ.I)  GO TO 21
    9 CONTINUE
   15 CALL PUTROW(3,2,WORK,KCOL)
   21 CONTINUE
      CALL DCLOSE(4)
      CALL DCLOSE(3)
      IPOS(3)= 2
      IPOS(IUMOD) = 3
      JUNITF=  4
      CALL TRAN (KORE,WORK,WORK,3,IUMOD,IUGO1,IUGO2,JUNITF,NAMPH)
   12 CONTINUE
C
C
C
C
C READ IN UNSORTED MODAL MASS AND MODAL STIFFNESS.
C
      CALL GEDLAB(8HAFOM  02,IUMODM,NAME1,IFMODM,KROW,KCOL)
      CALL GETROW(IUMODM,1,ALLM(1),KCOL)
      CALL DCLOSE(IUMODM)
C
      CALL GEDLAB(8HAFOM  03,IUMODK,NAME2,IFMODK,LROW,LCOL)
      CALL GETROW(IUMODK,1,ALLK(1),LCOL)
      CALL DCLOSE(IUMODK)
C
C SORT MODAL MASS AND STORE FULL MATRIX.
C
      CALL PUDLAB(8HAFOM  02,IUMODM,NAME1,IFMODM,NQZ,NQZ)
      DO 30 I=1,NMODE
      DO 25 J=1,NMODE
   25 BUFFER(J)=0.0
      L=IDMODE(I)
      BUFFER(I)=ALLM(L)
```

```
      IF (LC38.NE.1.OR.NOMI.EQ.0)  GO TO 29
      DO 27 K=1,NOMI
      IF (NIND(K).EQ.I)  GO TO 30
   27 CONTINUE
      CALL REDVEC(BUFFER,NMODE)
   29 CALL PUTROW(IUMODM,1,BUFFER,NQZ)
   30 CONTINUE
      CALL DCLOSE(IUMODM)
C
C SORT MODAL STIFFNESS AND STORE FULL MATRIX.
C
      CALL PUDLAB(8HAFOM  03,IUMODK,NAME2,IFMODK,NQZ,NQZ)
      DO 40 I=1,NMODE
      DO 35 J=1,NMODE
   35 BUFFER(J)=0.0
      L=IDMODE(I)
      BUFFER(I)=ALLK(L)
      IF (LC38.NE.1.OR.NOMI.EQ.0)  GO TO 39
      DO 37 K=1,NOMI
      IF (NIND(K).EQ.I)  GO TO 40
   37 CONTINUE
      CALL REDVEC(BUFFER,NMODE)
   39 CALL PUTROW(IUMODK,1,BUFFER,NQZ)
   40 CONTINUE
      CALL DCLOSE(IUMODK)
C
      IF(KFREE.EQ.1) GO TO 43
C SORT THE PLUG MODES.
C
      J=1
      DO 42 I=1,NMODE
      KF=IDMODE(I)
      PHP(1,J)=PHP(1,KF)
      PHP(2,J)=PHP(2,KF)
      PHP(3,J)=PHP(3,KF)
      J=J+1
   42 CONTINUE
      IF (LC38.NE.1.OR.NOMI.EQ.0)  GO TO 43
      DO 46 K=1,3
      DO 44 J=1,NMODE
      PHPTMP(J) = PHP(K,J)
   44 CONTINUE
      CALL REDVEC(PHPTMP,NMODE)
      DO 45 J=1,NMODE
      PHP(K,J) = PHPTMP(J)
   45 CONTINUE
   46 CONTINUE
C
   43 CONTINUE
C
C    ******************************************************
C    *        THE FOLLOWING LINES OF FASTOP CODE HAVE     *
C    *        BEEN COMMENTED OUT BECAUSE THEY ARE NOT     *
C    *        USED IN THE CURRENT VERSION OF ESP.         *
C    ******************************************************
C
C     IF(KLUB.EQ.0) GO TO 85
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C     IF(KLUQ.EQ.O) GO TO 45                                            AFOM    344
C                                                                       AFOM    345
C (KLUQ=1) COMPUTE TRANSFORMATION MATRIX QT AND ITS TRANSPOSE Q.        AFOM    346
C          QT=PHT*B                                                     AFOM    347
C                                                                       AFOM    348
C     IPOS(IUPHT)=IFPHT                                                 AFOM    349
C     IPOS(IUB)=IFB                                                     AFOM    350
C     IPOS(IUQT)=IFQT                                                   AFOM    351
C     IPOS(IUGO1)=IFS1                                                  AFOM    352
C     IPOS(IUGO2)=IFS2                                                  AFOM    353
C                                                                       AFOM    354
C     CALL MULT(KORE,WORK,WORK,WORK,IUPHT,IUB,IUQT,IUGO1,IUGO2,NAMQT,O) AFOM    355
C     CALL PROGNA(4H(AFO,4HM  ))                                        AFOM    356
C                                                                       AFOM    357
C     IOQT=KLUFO(1)                                                     AFOM    358
C     IF(IOQT.EQ.2.AND.KFREE.EQ.1) CALL PRMAT1(IUQT,IFQT,WORK,O,IUPR,7, AFOM    359
C    1   92,92H (TRANSPOSE OF QT TRANSFORMS DISPLACEMENTS FROM MODAL COO AFOM    360
C    2RDINATES TO STRUCTURAL COORDINATES))                              AFOM    361
C     IF(IOQT.EQ.2.AND.KFREE.EQ.2) CALL PRMAT1(IUQT,IFQT,WORK,O,IUPR,7, AFOM    362
C    1 101,101H (TRANSPOSE OF QT TRANSFORMS RELATIVE DISPLACEMENTS FROM AFOM    363
C    2MODAL COORDINATES TO STRUCTURAL COORDINATES))                     AFOM    364
C                                                                       AFOM    365
C     IPOS(IUQT)=IFQT                                                   AFOM    366
C     IPOS(IUQ)=IFQ                                                     AFOM    367
C     IPOS(IUGO1)=IFS1                                                  AFOM    368
C     IPOS(IUGO2)=IFS2                                                  AFOM    369
C                                                                       AFOM    370
C     JUNITF=IUQT+1                                                     AFOM    371
C     CALL TRAN(KORE,WORK,WORK,IUQT,IUQ,IUGO1,IUGO2,JUNITF,NAMQ)        AFOM    372
C     CALL PROGNA(4H(AFO,4HM  ))                                        AFOM    373
C                                                                       AFOM    374
C     GO TO 50                                                          AFOM    375
C                                                                       AFOM    376
C  45 CONTINUE                                                          AFOM    377
C                                                                       AFOM    378
C (KLUQ=O) TRANSPOSE MATRIX PHT TO OBTAIN MATRIX PH.                    AFOM    379
C                                                                       AFOM    380
C     IPOS(IUPHT)=IFPHT                                                 AFOM    381
C     IPOS(IUPH)=IFPH                                                   AFOM    382
C     IPOS(IUGO1)=IFS1                                                  AFOM    383
C     IPOS(IUGO2)=IFS2                                                  AFOM    384
C                                                                       AFOM    385
C     JUNITF=IUPHT+1                                                    AFOM    386
C     CALL TRAN(KORE,WORK,WORK,IUPHT,IUPH,IUGO1,IUGO2,JUNITF,NAMPH)     AFOM    387
C     CALL PROGNA(4H(AFO,4HM  ))                                        AFOM    388
C                                                                       AFOM    389
C                                                                       AFOM    390
C  50 CONTINUE                                                          AFOM    391
C                                                                       AFOM    392
C     IF(KFREE.EQ.1) GO TO 85                                           AFOM    393
C                                                                       AFOM    394
C (FREE-FREE STRUCTURE)                                                 AFOM    395
C COMPUTE TRANSFORMATION MATRICES BETWEEN MODAL DISPLACEMENTS AND       AFOM    396
C ABSOLUTE STRUCTURAL DISPLACEMENTS.                                    AFOM    397
C    1. IF IRED=1, COMPUTE  QA=Q+LAMBDA(STRUCT)*PHP                     AFOM    398
C    2. IF IRED=O, COMPUTE  PHA=PH+LAMBDA*PHP                           AFOM    399
C                                                                       AFOM    400
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      C                                                                         AFOM   401
      C DEFINE ADDITIONAL UNITS AND FILES                                       AFOM   402
      C                                                                         AFOM   403
      C     CALL UNFIL(35)                                                      AFOM   404
      C                                                                         AFOM   405
      C FIRST, READ STRUCTURAL LAMBDA MATRIX INTO CORE. STORE IN ELAM.          AFOM   406
      C                                                                         AFOM   407
      C     CALL GEDLAB(8HAFOM  04,IUSLTI,NAME1,IFSLTI,KROW,KCOL)               AFOM   408
      C     DO 55 I=1,KROW                                                      AFOM   409
      C     CALL GETROW(IUSLTI,1,ELAM(1,I),KCOL)                                AFOM   410
      C  55 CONTINUE                                                            AFOM   411
      C     CALL DCLOSE(IUSLTI)                                                 AFOM   412
      C                                                                         AFOM   413
      C     LROW=KCOL                                                           AFOM   414
      C     LCOL=KROW                                                           AFOM   415
      C                                                                         AFOM   416
      C NOW COMPUTE QA (IRED=1),OR PHA(IRED=0). STORE RESULT ON SCRATCH SPACE.  AFOM   417
      C                                                                         AFOM   418
      C     IUCOM=IUQ                                                           AFOM   419
      C     IFCOM=IFQ                                                           AFOM   420
      C     IF(IRED.EQ.0) IUCOM=IUPH                                            AFOM   421
      C     IF(IRED.EQ.0) IFCOM=IFPH                                            AFOM   422
      C                                                                         AFOM   423
      C     CALL GEDLAB(8HAFOM  05,IUCOM,NAME1,IFCOM,KROW,KCOL)                 AFOM   424
      C     II=IRED+1                                                           AFOM   425
      C     CALL PUDLAB(8HAFOM  04,IUGO2,NAMAB(1,II),IFS2,KROW,KCOL)            AFOM   426
      C                                                                         AFOM   427
      C     DO 70 I=1,KROW                                                      AFOM   428
      C     CALL GETROW(IUCOM,1,BUFFER,KCOL)                                    AFOM   429
      C     DO 65 K=1,NMODE                                                     AFOM   430
      C     C=0.0                                                               AFOM   431
      C     DO 60 J=1,LCOL                                                      AFOM   432
      C     C= C+ELAM(I,J)*PHP(J,K)                                             AFOM   433
      C  60 CONTINUE                                                            AFOM   434
      C     BUFFER(K)=BUFFER(K)+C                                               AFOM   435
      C  65 CONTINUE                                                            AFOM   436
      C     CALL PUTROW(IUGO2,1,BUFFER,NMODE)                                   AFOM   437
      C  70 CONTINUE                                                            AFOM   438
      C                                                                         AFOM   439
      C     CALL DCLOSE(IUCOM)                                                  AFOM   440
      C     CALL DCLOSE(IUGO2)                                                  AFOM   441
      C                                                                         AFOM   442
      C (IRED)=1,TRANSFER QA TO PERMANENT FILE (FOLLOWING Q)                     AFOM   443
      C (IRED)=0,TRANSFER PHA TO PERMANENT FILE (FOLLOWING PH)                  AFOM   444
      C                                                                         AFOM   445
      C     IUCOM=IUQA                                                          AFOM   446
      C     IFCOM=IFQA                                                          AFOM   447
      C     IF(IRED.EQ.0) IUCOM=IUPHA                                           AFOM   448
      C     IF(IRED.EQ.0) IFCOM=IFPHA                                           AFOM   449
      C                                                                         AFOM   450
      C     CALL GEDLAB(8HAFOM  06,IUGO2,NAME1,IFS2,KROW,KCOL)                  AFOM   451
      C     CALL PUDLAB(8HAFOM  05,IUCOM,NAME1,IFCOM,KROW,KCOL)                 AFOM   452
      C     DO 75 I=1,KROW                                                      AFOM   453
      C     CALL GETROW(IUGO2,1,BUFFER,KCOL)                                    AFOM   454
      C     CALL PUTROW(IUCOM,1,BUFFER,KCOL)                                    AFOM   455
      C  75 CONTINUE                                                            AFOM   456
      C     CALL DCLOSE(IUGO2)                                                  AFOM   457
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C     CALL DCLOSE(IUCOM)                                                  AFOM     458
C                                                                         AFOM     459
C IRED=1, TRANSPOSE QA TO GET QAT                                         AFOM     460
C IRED=0, TRANSPOSE PHA TO GET PHAT                                       AFOM     461
C                                                                         AFOM     462
C     IUCOM=IUQA                                                          AFOM     463
C     IFCOM=IFQA                                                          AFOM     464
C     IUCOMT=IUQAT                                                        AFOM     465
C     IFCOMT=IFQAT                                                        AFOM     466
C     IF(IRED.EQ.1) GO TO 80                                              AFOM     467
C     IUCOM=IUPHA                                                         AFOM     468
C     IFCOM=IFPHA                                                         AFOM     469
C     IUCOMT=IUPHAT                                                       AFOM     470
C     IFCOMT=IFPHAT                                                       AFOM     471
C  80 CONTINUE                                                            AFOM     472
C                                                                         AFOM     473
C     IPOS(IUCOM)=IFCOM                                                   AFOM     474
C     IPOS(IUCOMT)=IFCOMT                                                 AFOM     475
C     IPOS(IUGO1)=IFS1                                                    AFOM     476
C     IPOS(IUGO2)=IFS2                                                    AFOM     477
C                                                                         AFOM     478
C     JU=IUCOMT+1                                                         AFOM     479
C     CALL TRAN(KORE,WORK,WORK,IUCOM,IUCOMT,IUGO1,IUGO2,JU,NAMABT(1,II)) AFOM     480
C     CALL PROGNA (4H(AFO, 4HM  ))                                        AFOM     481
C     IF(IRED.EQ.1.AND.IOQT.EQ.2) CALL PRMAT1(IUQAT,IFQAT,WORK,0,IUPR,7, AFOM     482
C    1 102,102H (TRANSPOSE OF QAT TRANSFORMS ABSOLUTE DISPLACEMENTS FROM AFOM     483
C    2 MODAL COORDINATES TO STRUCTURAL COORDINATES))                      AFOM     484
C                                                                         AFOM     485
C  85 CONTINUE                                                            AFOM     486
C                                                                         AFOM     487
C  *****************************************************                  AFOM     488
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *                  AFOM     489
C  *****************************************************                  AFOM     490
C                                                                         AFOM     491
      IF(IFIN.EQ.1) GO TO 150                                             AFOM     492
C                                                                         AFOM     493
C CHECK FLUTTER SPEED TO SEE IF IT FALLS IN THE FLUTTER BAND.             AFOM     494
C IF SO, CHECK TO SEE IF DESIGN HAS SATISFIED CONVERGENCE CRITERIA.       AFOM     495
C                                                                         AFOM     496
      LEFT=LINES-KOUNT                                                    AFOM     497
      IF(LEFT.LT.4) KOUNT=LINES                                           AFOM     498
      CALL TITLES(2)                                                      AFOM     499
      WRITE(IUPR,9006) VF                                                 AFOM     500
      KOUNT=KOUNT+4                                                       AFOM     501
C                                                                         AFOM     502
      IF(VF.LT.VDES) GO TO 100                                            AFOM     503
C                                                                         AFOM     504
      IF(NPASS.NE.0.OR.NCYC.NE.0) GO TO 95                                AFOM     505
C                                                                         AFOM     506
C INITIAL FLUTTER SPEED IS LARGER THAN DESIRED SPEED- EXIT PROGRAM.       AFOM     507
C                                                                         AFOM     508
      KOUNT=LINES                                                         AFOM     509
      CALL TITLES(2)                                                      AFOM     510
      WRITE(IUPR,9007)                                                    AFOM     511
C                                                                         AFOM     512
      KWIT=1                                                              AFOM     513
      GO TO 9999                                                          AFOM     514
```

```
C
   95 VUP=VDES*(1.0+EPS1)
      IF(VF.GT.VUP) GO TO 100
C
C THE CURRENT FLUTTER SPEED IS IN THE FLUTTER BAND.
C
      IBAND=IBAND+1
      LEFT=LINES-KOUNT
      IF(LEFT.LT.5) KOUNT=LINES
      CALL TITLES(2)
      WRITE(IUPR,9008) IBAND
      KOUNT=KOUNT+5
      IF(IBAND.LT.2) GO TO 150
      LEFT=LINES-KOUNT
      IF(LEFT.LT.3) KOUNT=LINES
      CALL TITLES(2)
      WRITE(IUPR,9009) DW
      KOUNT=KOUNT+3
      DWA=ABS(DW)
      IF(DWA.GE.DWMAX) GO TO 150
C
C THE DESIGN SATISFIES THE CONVERGENCE CRITERIA.
C
      LEFT=LINES-KOUNT
      IF(LEFT.LT.4) KOUNT=LINES
      CALL TITLES(2)
      WRITE(IUPR,9010)
      KOUNT=KOUNT+4
C
      IFIN=IFIN+1
      GO TO 150
C
  100 CONTINUE
C
C THE CURRENT FLUTTER SPEED IS NOT IN THE FLUTTER BAND.
C
C    *****************************************************
C    *      THE FOLLOWING LINES OF FASTOP CODE HAVE      *
C    *      BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *
C    *      USED IN THE CURRENT VERSION OF ESP.          *
C    *****************************************************
C     LEFT=LINES-KOUNT
C     IF(LEFT.LT.3) KOUNT=LINES
C     CALL TITLES(2)
C     WRITE(IUPR,9011)
C     KOUNT=KOUNT+3
C    *****************************************************
C    *      END OF CODE THAT HAS BEEN COMMENTED OUT.     *
C    *****************************************************
C
      IBAND=0
C
  150 CONTINUE
C
C
C DETERMINE THE FLUTTER VELOCITY DERIVATIVES.
C
```

```
      C FIRST, SET SCRATCH FILE ON IUIN1.                                    AFOM     572
      C                                                                      AFOM     573
            CALL UNFIL(4)                                                    AFOM     574
      C                                                                      AFOM     575
            CALL PROGNA(4H(AFO,4HM  ))                                       AFOM     576
      C                                                                      AFOM     577
            NROW=2*KFREE                                                     AFOM     578
            CALL DRVTV(WORK,BUFFER,NROW)                                     AFOM     579
      C                                                                      AFOM     580
            CALL PROGNA(4H(AFO,4HM  ))                                       AFOM     581
            CALL STRDES                                                      AFOM     582
            CALL PROGNA(4H(AFO,4HM  ))                                       AFOM     583
            CALL UNFIL(6)                                                    AFOM     584
            IF(ICYCLE.LT.O) IFIN = 5                                         AFOM     585
      C                                                                      AFOM     586
            IF(IFIN.NE.1) GO TO 220                                          AFOM     587
      C                                                                      AFOM     588
      C (IFIN=1)- EXIT THE PROGRAM.                                          AFOM     589
      C                                                                      AFOM     590
            KWIT=1                                                           AFOM     591
            GO TO 9999                                                       AFOM     592
      C                                                                      AFOM     593
        220 CONTINUE                                                         AFOM     594
      C                                                                      AFOM     595
            IF(IFIN.LE.2) GO TO 250                                          AFOM     596
      C                                                                      AFOM     597
      C (IFIN GREATER THAN 2)- PREPARE OUTPUT TAPES AND EXIT THE PROGRAM.    AFOM     598
      C                                                                      AFOM     599
      C  ******************************************************              AFOM     600
      C  *       THE FOLLOWING LINE OF FASTOP CODE HAS             *         AFOM     601
      C  *       BEEN COMMENTED OUT BECAUSE IT IS NOT              *         AFOM     602
      C  *       USED IN THE CURRENT VERSION OF ESP.               *         AFOM     603
      C  ******************************************************              AFOM     604
      C     CALL TAPOUT(WORK,BUFFER,BUFFER)                                  AFOM     605
      C                                                                      AFOM     606
            CALL PROGNA(4H(AFO,4HM  ))                                       AFOM     607
      C                                                                      AFOM     608
            KWIT=1                                                           AFOM     609
            GO TO 9999                                                       AFOM     610
      C                                                                      AFOM     611
        250 CONTINUE                                                         AFOM     612
      C                                                                      AFOM     613
      C                                                                      AFOM     614
      C CALL THE FLUTTER RESIZING PROGRAM.                                   AFOM     615
      C                                                                      AFOM     616
            KVAR=NVAR                                                        AFOM     617
      C                                                                      AFOM     618
      C  ******************************************************              AFOM     619
      C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE           *         AFOM     620
      C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT           *         AFOM     621
      C  *       USED IN THE CURRENT VERSION OF ESP.               *         AFOM     622
      C  ******************************************************              AFOM     623
      C                                                                      AFOM     624
      C     IF(KLUB.EQ.O) GO TO 280                                          AFOM     625
      C     CALL FLTDES(WORK,WORK,KVAR)                                      AFOM     626
      C                                                                      AFOM     627
      C     CALL PROGNA(4H(AFO,4HM  ))                                       AFOM     628
```

```
C                                                                       AFOM
C 280 CONTINUE                                                          AFOM
C                                                                       AFOM
C  ****************************************************                 AFOM
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *               AFOM
C  ****************************************************                 AFOM
C                                                                       AFOM
      NCYC=NCYC+1                                                       AFOM
      IF(NCYC.EQ.NFIX) IFIN=IFIN+2                                      AFOM
C                                                                       AFOM
C THE STRUCTURE HAS NOW BEEN RESIZED FOR FLUTTER. COMPUTE THE           AFOM
C INCREMENTAL MODAL MASS, INCM, AND INCREMENTAL MODAL STIFFNESS,INCK,   AFOM
C ASSOCIATED WITH THIS LATEST RESIZING.                                 AFOM
C                                                                       AFOM
C  ****************************************************                 AFOM
C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE      *               AFOM
C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *               AFOM
C  *       USED IN THE CURRENT VERSION OF ESP.          *               AFOM
C  ****************************************************                 AFOM
C                                                                       AFOM
C     KMODE=NMODE                                                       AFOM
C     CALL INCMK(WORK,KORE,KOREDP,BUFFER,KMODE)                         AFOM
C                                                                       AFOM
C     CALL PROGNA (4H(AFO,4HM  ))                                       AFOM
C                                                                       AFOM
C UPDATE THE MODAL MASS AND MODAL STIFFNESS.                            AFOM
C                                                                       AFOM
C     CALL NEWMK(WORK)                                                  AFOM
C                                                                       AFOM
C     CALL PROGNA(4H(AFO,4HM  ))                                        AFOM
C                                                                       AFOM
C  ****************************************************                 AFOM
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *               AFOM
C  ****************************************************                 AFOM
C                                                                       AFOM
      KWIT=0                                                            AFOM
C                                                                       AFOM
C                                                                       AFOM
 9999 CONTINUE                                                          AFOM
C                                                                       AFOM
C                                                                       AFOM
      CALL TIMEB (39, 39HFROM AFOM - END OF FLUTTER OPTIMIZATION)       AFOM
      CALL MESAGE(2,4,4HAFOM)                                           AFOM
C                                                                       AFOM
 9000 FORMAT(18A4)                                                      AFOM
 9001 FORMAT(4F10.3)                                                    AFOM
 9002 FORMAT(4I5)                                                       AFOM
 9003 FORMAT(//,10X,  24HREQUIRED FLUTTER SPEED =,F12.4,6H KNOTS,       AFOM
     1       //,10X,  26HFLUTTER BAND EXTENDS FROM ,F12.4,7H KNOTS ,    AFOM
     2                 3HTO ,F12.4,6H KNOTS,                            AFOM
     3       //,10X,  46HCONVERGENCE CRITERION - TWO SUCCESSIVE DESIGNS, AFOM
     4                43H WITH SPEEDS IN THE FLUTTER BAND AND WHICH ,   AFOM
     5        /,10X,30HDIFFER IN WEIGHT BY LESS THAN ,F12.4,            AFOM
     6                 8H POUNDS.,/)                                    AFOM
 9004 FORMAT(//,10X,  33HTHE PROGRAM WILL ATTEMPT TO TAKE ,I3,          AFOM
     1                46H APROXIMATELY EQUAL STEPS TO REACH THE CENTER , AFOM
     2                34HOF THE FLUTTER BAND AND WILL THEN ,            AFOM
```

```
                 3        /,10X,  43HITERATE UNTIL THE CONVERGENCE CRITERION IS ,    AFOM    686
                 4                42HSATISFIED. HOWEVER, THE MAXIMUM NUMBER OF ,     A,OM    687
                 5                13HREDESIGNS IS ,I3,/)                             AFOM    688
            9005 FORMAT(//,10X,   41HMAXIMUM CUT FOR REDESIGN OF A STRUCTURAL ,      AFOM    689
                 1                10HVARIABLE =,F10.2, 8H PERCENT,                   AFOM    690
                 2        /,10X,  43HMAXIMUM CUT FOR REDESIGN OF A MASS BALANCE ,    AFOM    691
                 3                10HVARIABLE =,F8.2,  8H PERCENT,                   AFOM    692
                 4       //,10X,  46HLINEARLY PREDICTED FLUTTER SPEED STEP SIZE IS , AFOM    693
                 5                27HACCEPTABLE IF IT IS WITHIN ,F10.3,              AFOM    694
                 6                10H KNOTS OR ,F10.3, 9H PERCENT ,                  AFOM    695
                 7        /,10X   25HOF THE DESIRED STEP SIZE.,/)                    AFOM    696
            9006 FORMAT(//,10X,   23HCURRENT FLUTTER SPEED =,F15.4,   6H KNOTS,/)    AFOM    697
            9007 FORMAT(//,10X,   45HTHE INITIAL FLUTTER SPEED IS LARGER THAN THE ,  AFOM    698
                 1                15HREQUIRED SPEED.,                                AFOM    699
                 2        /,10X,  12HEXIT PROGRAM,/)                                 AFOM    700
            9008 FORMAT(/,10X,    41HTHIS FLUTTER SPEED IS IN THE FLUTTER BAND,      AFOM    701
                 1       //,10X,   7HIBAND =,I2,/)                                   AFOM    702
            9009 FORMAT(/,10X,    40HWEIGHT CHANGE IN LAST FLUTTER REDESIGN =,       AFOM    703
                 1       1PE15.5,/)                                                  AFOM    704
            9010 FORMAT(/,10X,    34HCONVERGENCE CRITERION IS SATISFIED,             AFOM    705
                 1        /,10X,  21HEXIT DECISION IS MADE,/)                        AFOM    706
            9011 FORMAT(/,10X,    40HFLUTTER SPEED IS NOT IN THE FLUTTER BAND,/)     AFOM    707
            9014 FORMAT(//,10X,30(1H*),    33H FLUTTER OPTIMIZATION PARAMETERS ,     AFOM    708
                 1              30(1H*),/)                                           AFOM    709
           C                                                                         AFOM    710
                 RETURN                                                              AFOM    711
                 END                                                                 AFOM    712
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 AFOM	24	710

VARIABLES	SN	TYPE		RELOCATION								
11654	ALLK	REAL	ARRAY		REFS	41	275	302				
11604	ALLM	REAL	ARRAY		REFS	41	271	285				
11246	BUFFER	REAL	ARRAY		REFS	38	290	291	307	308	578	
					DEFINED	283	285	300	302			
242	CSCL	REAL		FLUT	REFS	89						
15	D	REAL		KLUES	REFS	63	DEFINED	166				
27	DBAL	REAL		KLUES	REFS	63	DEFINED	166				
16	DEL	REAL		KLUES	REFS	63	DEFINED	166				
5	DW	REAL		WAYTS	REFS	95	530	532				
1403	DWA	REAL			REFS	533	DEFINED	532				
12	DWMAX	REAL		KLUES	REFS	63	533	DEFINED	164			
0	EMP	REAL	ARRAY	PLUG	REFS	66						
11	EPS1	REAL		KLUES	REFS	63	515	DEFINED	164			
17	EPS2	REAL		KLUES	REFS	63	DEFINED	166				
0	FMTA	REAL	ARRAY	CFMTA	REFS	30	61	147				
1372	I	INTEGER			REFS	217	220	223	247	250	253	284
					285	288	301	302	305	317		
					DEFINED	216	246	281	298	316		
22	IBAND	INTEGER		KLUES	REFS	63	520	524	526	DEFINED	520	564

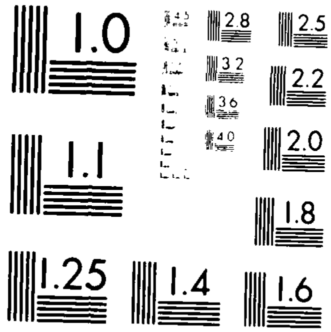
```
VARIABLES      SN  TYPE              RELOCATION
   0  ICYCLE       INTEGER                   STRCLU       REFS       105       584    DEFINED     135
   3  IDENS        INTEGER                   COLS         REFS        90
 244  IDMODE       INTEGER      ARRAY        FLUT         REFS        89       217       220       247       250       284       301
                                                          317
   7  IDNOPT       INTEGER                   KLUES        REFS        63
  76  IDSTR        INTEGER      ARRAY        STORES       REFS       100
  40  IDYDOF       INTEGER      ARRAY        STORES       REFS       100
  21  IFA          INTEGER                   PLACES       REFS        72
  67  IFADD        INTEGER                   PLACES       REFS        72
  41  IFADDI       INTEGER                   PLACES       REFS        72
  33  IFB          INTEGER                   PLACES       REFS        72
  71  IFBAL        INTEGER                   PLACES       REFS        72
  43  IFBALI       INTEGER                   PLACES       REFS        72
 117  IFBR         INTEGER                   PLACES       REFS        72
  53  IFBT         INTEGER                   PLACES       REFS        72
  73  IFDESF       INTEGER                   PLACES       REFS        72
  45  IFDESI       INTEGER                   PLACES       REFS        72
  55  IFDESN       INTEGER                   PLACES       REFS        72
  35  IFDESO       INTEGER                   PLACES       REFS        72
  21  IFDLT        INTEGER                   PLAYFF       REFS        68
   3  IFDLTI       INTEGER                   PLAYFF       REFS        68
  77  IFDUM1       INTEGER                   PLACES       REFS        72
 101  IFDUM2       INTEGER                   PLACES       REFS        72
 103  IFDUM3       INTEGER                   PLACES       REFS        72
  23  IFIN         INTEGER                   KLUES        REFS        63       491       543       586       595       636
                                                       DEFINED       543       584       636
 141  IFINCK       INTEGER                   PLACES       REFS        72
 137  IFINCM       INTEGER                   PLACES       REFS        72
  31  IFKS         INTEGER                   PLACES       REFS        72
 105  IFL          INTEGER                   PLACES       REFS        72
 115  IFLR         INTEGER                   PLACES       REFS        72
  57  IFMD         INTEGER                   PLACES       REFS        72
  65  IFMDB        INTEGER                   PLACES       REFS        72
  37  IFMDBI       INTEGER                   PLACES       REFS        72
   1  IFMDFF       INTEGER                   PLAYFF       REFS        68
  61  IFMEMF       INTEGER                   PLACES       REFS        72
  25  IFMEMN       INTEGER                   PLACES       REFS        72
  51  IFMEMO       INTEGER                   PLACES       REFS        72
   5  IFMOD        INTEGER                   LOCSTR       REFS       106       233
 125  IFMODK       INTEGER                   PLACES       REFS        72       274       297
 123  IFMODM       INTEGER                   PLACES       REFS        72       270       280
  15  IFMPL        INTEGER                   PLAYFF       REFS        68
   7  IFMPLI       INTEGER                   PLAYFF       REFS        68
   3  IFMREF       INTEGER                   LOCSTR       REFS       106
  13  IFPATF       INTEGER                   PLAYFF       REFS        68
 135  IFPH         INTEGER                   PLACES       REFS        72
  27  IFPHA        INTEGER                   PLAYFF       REFS        68
  31  IFPHAT       INTEGER                   PLAYFF       REFS        68
 127  IFPHT        INTEGER                   PLACES       REFS        72       213       232
 121  IFPHTF       INTEGER                   PLACES       REFS        72       210
 133  IFQ          INTEGER                   PLACES       REFS        72
  23  IFQA         INTEGER                   PLAYFF       REFS        68
  25  IFQAT        INTEGER                   PLAYFF       REFS        68
 131  IFQT         INTEGER                   PLACES       REFS        72
  11  IFSCR        INTEGER                   PLACES       REFS        72
  17  IFSLT        INTEGER                   PLAYFF       REFS        68
   5  IFSLTI       INTEGER                   PLAYFF       REFS        68
```

```
VARIABLES       SN  TYPE            RELOCATION
   27  IFSTFN     INTEGER                 PLACES        REFS        72
   63  IFSTFO     INTEGER                 PLACES        REFS        72
    1  IFSTRI     INTEGER                 LOCSTR        REFS       106
   12  IFS1       INTEGER                 PLACES        REFS        72      234
   13  IFS2       INTEGER                 PLACES        REFS        72      235
   14  IFS3       INTEGER                 PLACES        REFS        72
   15  IFS4       INTEGER                 PLACES        REFS        72
   11  IFTPGT     INTEGER                 PLAYFF        REFS        68
   75  IFWT       INTEGER                 PLACES        REFS        72
   47  IFWTI      INTEGER                 PLACES        REFS        72
   23  IFY        INTEGER                 PLACES        REFS        72
  107  IFYT       INTEGER                 PLACES        REFS        72
  111  IFZ        INTEGER                 PLACES        REFS        72
  113  IFZR       INTEGER                 PLACES        REFS        72
   10  IINITT     INTEGER                 COLS          REFS        90
    2  IMAXT      INTEGER                 COLS          REFS        90
    1  IMINT      INTFGER                 COLS          REFS        90
    7  IMINTO     INTEGER                 COLS          REFS        90
    4  IOLDT      INTEGER                 COLS          REFS        90
    5  IOLDW      INTEGER                 COLS          REFS        90
    0  IPOS       INTEGER       ARRAY     FILE          REFS        39       94   DEFINED     232       233       234       235
                                                         259       260
    2  IRED       INTEGER                 KLUES         REFS        63
    6  ISRAT      INTEGER                 COLS          REFS        90
    2  ISTDOF     INTEGER       ARRAY     STORES        REFS       100
    1  ISTEP      INTEGER                 STRCLU        REFS       105
    0  IT         INTEGER                 COLS          REFS        90
    2  ITAPEP     INTEGER                 COMRWP        REFS        62
    0  ITAPER     INTEGER                 COMRWP        REFS        62   I/O REFS      146       147
    1  ITAPEW     INTEGER                 COMRWP        REFS        62
   20  IUA        INTEGER                 PLACES        REFS        72
   66  IUADD      INTEGER                 PLACES        REFS        72
   40  IUADDI     INTEGER                 PLACES        REFS        72
   32  IUB        INTEGER                 PLACES        REFS        72
   70  IUBAL      INTEGER                 PLACES        REFS        72
   42  IUBALI     INTEGER                 PLACES        REFS        72
  116  IUBR       INTEGER                 PLACES        REFS        72
   52  IUBT       INTEGER                 PLACES        REFS        72
   16  IUCD       INTEGER                 PLACES        REFS        72      161   I/O REFS      164       165       166
   72  IUDESF     INTEGER                 PLACES        REFS        72
   44  IUDESI     INTEGER                 PLACES        REFS        72
   54  IUDESN     INTEGER                 PLACES        REFS        72
   34  IUDESO     INTEGER                 PLACES        REFS        72
   20  IUDLT      INTEGER                 PLAYFF        REFS        68
    2  IUDLTI     INTEGER                 PLAYFF        REFS        68
   76  IUDUM1     INTEGER                 PLACES        REFS        72
  100  IUDUM2     INTEGER                 PLACES        REFS        72
  102  IUDUM3     INTEGER                 PLACES        REFS        72
    4  IUGO1      INTEGER                 PLACES        REFS        72      234       237       262
    5  IUGO2      INTEGER                 PLACES        REFS        72      235       237       262
    6  IUGO3      INTEGER                 PLACES        REFS        72
    7  IUGO4      INTEGER                 PLACES        REFS        72
  140  IUINCK     INTEGER                 PLACES        REFS        72
  136  IUINCM     INTEGER                 PLACES        REFS        72
    0  IUIN1      INTEGER                 PLACES        REFS        72
    1  IUIN2      INTEGER                 PLACES        REFS        72
   30  IUKS       INTEGER                 PLACES        REFS        72
```

VARIABLES		SN	TYPE	RELOCATION								
104	IUL		INTEGER	PLACES	REFS	72						
114	IULR		INTEGER	PLACES	REFS	72						
56	IUMD		INTEGER	PLACES	REFS	72						
64	IUMDB		INTEGER	PLACES	REFS	72						
36	IUMDBI		INTEGER	PLACES	REFS	72						
0	IUMDFF		INTEGER	PLAYFF	REFS	68						
60	IUMEMF		INTEGER	PLACES	REFS	72						
24	IUMEMN		INTEGER	PLACES	REFS	72						
50	IUMEMO		INTEGER	PLACES	REFS	72						
4	IUMOD		INTEGER	LOCSTR	REFS	106	233	237	260	262		
124	IUMODK		INTEGER	PLACES	REFS	72	274	275	276	297	308	310
122	IUMODM		INTEGER	PLACES	REFS	72	270	271	272	280	291	293
14	IUMP!		INTEGER	PLAYFF	REFS	68						
6	IUMPLI		INTEGER	PLAYFF	REFS	68						
2	IUMREF		INTEGER	LOCSTR	REFS	106						
2	IUOUT1		INTEGER	PLACES	REFS	72						
3	IUOUT2		INTEGER	PLACES	REFS	72						
12	IUPATF		INTEGER	PLAYFF	REFS	68						
134	IUPH		INTEGER	PLACES	REFS	72						
26	IUPHA		INTEGER	PLAYFF	REFS	68						
30	IUPHAT		INTEGER	PLAYFF	REFS	68						
126	IUPHT		INTEGER	PLACES	REFS	72	213	225	229	232	236	237
120	IUPHTF		INTEGER	PLACES	REFS	72	210	219	228			
17	IUPR		INTEGER	PLACES	REFS	72	I/O REFS	499	510	524	530	540
132	IUQ		INTEGER	PLACES	REFS	72						
22	IUQA		INTEGER	PLAYFF	REFS	68						
24	IUQAT		INTEGER	PLAYFF	REFS	68						
130	IUQT		INTEGER	PLACES	REFS	72						
10	IUSCR		INTEGER	PLACES	REFS	72						
16	IUSLT		INTEGER	PLAYFF	REFS	68						
4	IUSLTI		INTEGER	PLAYFF	REFS	68						
26	IUSTFN		INTEGER	PLACES	REFS	72						
62	IUSTFO		INTEGER	PLACES	REFS	72						
0	IUSTRI		INTEGER	LOCSTR	REFS	106						
10	IUTPGT		INTEGER	PLAYFF	REFS	68						
74	IUWT		INTEGER	PLACES	REFS	72						
46	IUWTI		INTEGER	PLACES	REFS	72						
22	IUY		INTEGER	PLACES	REFS	72						
106	IUYT		INTEGER	PLACES	REFS	72						
110	IUZ		INTEGER	PLACES	REFS	72						
112	IUZR		INTEGER	PLACES	REFS	72						
11	IWPUT		INTEGER	COLS	REFS	90						
1374	J		INTEGER		REFS	283	300	318	319	320	321	2*326
					2*330	DEFINED	218	248	282	299	315	321
					325	329						
21	JDRV		INTEGER	COLS	REFS	90						
22	JDRVO		INTEGER	COLS	REFS	90						
14	JINITT		INTEGER	COLS	REFS	90						
16	JMAXT		INTEGER	COLS	REFS	90						
15	JMINT		INTEGER	COLS	REFS	90						
20	JNEWT		INTEGER	COLS	REFS	90						
17	JOLDT		INTEGER	COLS	REFS	90						
23	JSPR1		INTEGER	COLS	REFS	90						
24	JSPR2		INTEGER	COLS	REFS	90						
25	JSPR3		INTEGER	COLS	REFS	90						
1376	JUNITF		INTEGER		FEFS	237	262	DEFINED	236	261		
13	JWPUT		INTEGER	COLS	REFS	90						

AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2 5/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL


1.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

VARIABLES		SN	TYPE		RELOCATION								
1375	K		INTEGER			REFS	223	253	288	305	326	330	
						DEFINED	222	252	287	304	324		
7	KBPAGE		INTEGER		CLIST	REFS	97						
1367	KCOL		INTEGER			REFS	210	213	219	225	243	244	249
						255	270	271					
1	KCONST		INTEGER		STORES	REFS	100						
1373	KF		INTEGER			REFS	218	248	318	319	320		
						DEFINED	217	247	317				
0	KFREE		INTEGER		KLUFF	REFS	67	242	312	577			
4	KLABEL		INTEGER		CLIST	REFS	97						
24	KLUB		INTEGER		KLUES	REFS	63						
4	KLUBAL		INTEGER		KLUES	REFS	63						
1	KLUFO		INTEGER	ARRAY	CLUFO	REFS	99	161					
3	KLUMD		INTEGER		KLUES	REFS	63						
1	KLUNAL		INTEGER		KLUES	REFS	63						
25	KLUQ		INTEGER		KLUES	REFS	63						
0	KLUSE		INTEGER		KLUES	REFS	63	162					
0	KORE		INTEGER		CORE	REFS	96	129	131	237	262		
						DEFINED	122						
1	KOREDP		INTEGER		CORE	REFS	96	DEFINED	129	131			
0	KOUNT		INTEGER		CLIST	REFS	97	496	500	521	525	527	531
						537	541	DEFINED	144	497	500	508	522
						525	528	531	538	541			
11	KOUNTH		INTEGER		CLIST	REFS	97						
12	KOUNTI		INTEGER		CLIST	REFS	97						
1	KPAGE		INTEGER		CLIST	REFS	97						
1366	KROW		INTEGER			REFS	210	243	270				
1371	KS		INTEGER			REFS	218	248	DEFINED	215	220	245	250
5	KTPAGE		INTEGER		CLIST	REFS	97						
0	KTSH		INTEGER		CTSH	REFS	58	136					
1405	KVAR	*	INTEGER			DEFINED	616						
0	KWIT		INTEGER		F.P.	DEFINED	24	512	590	608	663		
1363	L		INTEGER			REFS	147	2*150	285	302	DEFINED	147	149
						284	301						
1400	LCOL		INTEGER			REFS	274	275					
2	LC38		INTEGER		QELIM	REFS	109	212	221	251	286	303	323
1401	LEFT		INTEGER			REFS	497	522	528	538	DEFINED	496	521
						527	537						
2	LINES		INTEGER		CLIST	REFS	97	144	496	497	508	521	522
						527	528	537	538				
10	LINESG		INTEGER		CLIST	REFS	97						
3	LINEST		INTEGER		CLIST	REFS	97						
0	LKLUFO		INTEGER		CLUFO	REFS	99	160					
1377	LROW	*	INTEGER			REFS	274						
1	LTSH		INTEGER		CTSH	REFS	58	134	136	149			
0	LTSHFO		INTEGER		CTSHFO	REFS	59						
1361	LTSHR		INTEGER			REFS	147	DEFINED	134	136			
26	MORBAL		INTEGER		KLUES	REFS	63						
5	MSADD		INTEGER		KLUES	REFS	63						
2	M1		INTEGER		STRCLU	REFS	105						
3	M2		INTEGER		STRCLU	REFS	105						
4	M3		INTEGER		STRCLU	REFS	105						
5	M4		INTEGER		STRCLU	REFS	105						
11570	NAME1		INTEGER	ARRAY		REFS	40	210	243	270	280		
11572	NAME2		INTEGER	ARRAY		REFS	40	274	297				
11574	NAMPH		INTEGER	ARRAY		REFS	40	237	262	DEFINED	119		
11576	NAMPHT		INTEGER	ARRAY		REFS	40	213	244	DEFINED	119		

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      SUBROUTINE AFOM       74/74   OPT=1                      FTN 4.8+577       85/01/23. 08.10.44       PAGE     18

VARIABLES     SN  TYPE           RELOCATION
11600  NAMQ       INTEGER   ARRAY              REFS        40   DEFINED      119
11602  NAMQT      INTEGER   ARRAY              REFS        40   DEFINED      119
   13  NBAR       INTEGER           KLUES      REFS        63      192   DEFINED      165
 1364  NCC        INTEGER                      REFS       161   DEFINED      159
   20  NCYC       INTEGER           KLUES      REFS        63      145       157      504      635      636
                                             DEFINED      635
   14  N[illegible]  INTEGER        KLUES      REFS        63      636   DEFINED      165
    1  N[illegible]ND  INTEGER  ARRAY  FITR    REFS       108      223       253      288      305
 1365  NKLUFO     INTEGER                      REFS       161   DEFINED      160
  243  NMODE      INTEGER           FLUT       REFS        89      211       212      216      246      281      282
                                                  290     298      299       307      316      325      328      329
   21  NNN        INTEGER           KLUES      REFS        63   DEFINED      192
    0  NO         INTEGER           CONSTS     REFS        60
    0  NOMI       INTEGER           FITR       REFS       108      212       221      222      251      252      286
                                                  287     303      304       323
    6  NPAGE      INTEGER           CLIST      REFS        97
    6  NPASS      INTEGER           KLUES      REFS        63      504
 1370  NQZ        INTEGER                      REFS       213      244     2*280      291    2*297      308
                                             DEFINED      211      212
 1404  NROW       INTEGER                      REFS       578   DEFINED      577
    0  NUMSTR     INTEGER           STORES     REFS       100
   12  NVAR       INTEGER           COLS       REFS        90      616
   11  PHP        REAL      ARRAY   PLUG       REFS        66      318       319      320      326
                                             DEFINED      318      319       320      330
11724  PHPTMP     REAL      ARRAY              REFS        49      328       330   DEFINED      326
    0  QDW        REAL              QELIM      REFS       109
  362  SCALE      REAL      ARRAY   STORES     REFS       100
 1362  SOOOR    * REAL                       DEFINED      146
   11  STPOLD     REAL              STRCLU     REFS       105
  305  STRIDN     REAL      ARRAY   STORES     REFS       100
  266  STRIDO     REAL      ARRAY   STORES     REFS       100
  122  STRII      REAL      ARRAY   STORES     REFS       100
  160  STRIN      REAL      ARRAY   STORES     REFS       100
  141  STRIO      REAL      ARRAY   STORES     REFS       100
  343  STRRDN     REAL      ARRAY   STORES     REFS       100
  324  STRRDO     REAL      ARRAY   STORES     REFS       100
  177  STRRI      REAL      ARRAY   STORES     REFS       100
  235  STRRN      REAL      ARRAY   STORES     REFS       100
  216  STRRO      REAL      ARRAY   STORES     REFS       100
  261  STRWDN     REAL      ARRAY   STORES     REFS       100
  254  STRWDO     REAL      ARRAY   STORES     REFS       100
  103  STRWI      REAL      ARRAY   STORES     REFS       100
  115  STRWN      REAL      ARRAY   STORES     REFS       100
  110  STRWO      REAL      ARRAY   STORES     REFS       100
    2  TSH        REAL      ARRAY   CTSH       REFS        48       58   DEFINED      150
    1  TSHFO      REAL      ARRAY   CTSHFO     REFS        48       59       150   DEFINED      147
    0  UMOD       COMPLEX   ARRAY   FLUT       REFS        28       89
   10  VDES       REAL              KLUES      REFS        63      502       515   DEFINED      164
  240  VF         REAL              FLUT       REFS        89      499       502      516
  120  VMOD       COMPLEX   ARRAY   FLUT       REFS        28       89
   10  VNEW       REAL              STRCLU     REFS       105
    7  VOLD       REAL              STRCLU     REFS       105
    1  VQDW       REAL              QELIM      REFS       109
    6  VS         REAL              STRCLU     REFS       105
 1402  VUP        REAL                         REFS       516   DEFINED      515
    3  WBOTH      REAL              WAYTS      REFS        95
    0  WINITT     REAL              WAYTS      REFS        95
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VARIABLES     SN  TYPE            RELOCATION
    2  WMB        REAL                 WAYTS      REFS       95
 1406  WORK       REAL       ARRAY                REFS       31       219       225     2*237       249       255     2*262
                                                   578
    4  WPRES      REAL                 WAYTS      REFS       95
    1  WST        REAL                 WAYTS      REFS       95
  241  WW         REAL                 FLUT       REFS       89
    1  YES        INTEGER              CONSTS     REFS       26        60       136
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS         REFERENCES
       CLUES                  4            161
       DCLOSE                 1            228       229       257       258       272       276       293       310
       DRVTV                  3            578
       GEDLAB                 6            210       243       270       274
       GETROW                 4            219       249       271       275
       MESAGE                 3            154       670
       PROGNA                 2            152       200       238       575       580       582       606
       PUDLAB                 6            213       244       280       297
       PUTROW                 4            225       255       291       308
       REDVEC                 2            290       307       328
       STRDES                 0            581
       TAFOM                  1            141
       TIMEB                  2            155       669
       TITLES                 1            153       498       509       523       529       539
       TRAN                   9            237       262
       UNFIL                  1            198       573       583

INLINE FUNCTIONS    TYPE    ARGS          DEF LINE  REFERENCES
       ABS          REAL      1  INTRIN                532

STATEMENT LABELS               DEF LINE    REFERENCES
   30  2                         148         145
    0  4                         150         149
   66  6                         194         157       162
    0  8                         224         222
    0  9                         254         252
    0  10                        219         218
    0  11                        249         248
  224  12                        263         242
  127  14                        225         221
  207  15                        255         251
  131  20                        226         216       223
  211  21                        256         246       253
    0  25                        283         282
    0  27                        289         287
  270  29                        291         286
  272  30                        292         281       288
    0  35                        300         299
    0  37                        306         304
  326  39                        308         303
  330  40                        309         298       305
    0  42                        322         316
  405  43                        334         312       323
    0  44                        327         325
    0  45                        331         329
    0  46                        332         324
  435  95                        515         504
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STATEMENT LABELS                DEF LINE   REFERENCES
  506  100                        546        502      516
  507  150                        566        491      526      533      544
  533  220                        593        586
  541  250                        611        595
 1126  9000    FMT                672        146
 1130  9001    FMT                673        164      166
 1132  9002    FMT                674        165
 1134  9003    FMT  NO REFS       675
 1170  9004    FMT  NO REFS       682
 1222  9005    FMT  NO REFS       688
 1263  9006    FMT                696        499
 1271  9007    FMT                697        510
 1304  9008    FMT                700        524
 1314  9009    FMT                702        530
 1323  9010    FMT                704        540
 1334  9011    FMT  NO REFS       706
 1342  9014    FMT  NO REFS       707
  550  9999                       666        513      591      609

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   33  4        L          149 150       3B      INSTACK
  104  20       I          216 226      30B                EXT REFS  NOT INNER
  107  10       J          218 219       5B                EXT REFS
  122  8        K          222 224       5B      INSTACK     EXITS
  164  21       I          246 256      30B                EXT REFS  NOT INNER
  167  11       J          248 249       5B                EXT REFS
  202  9        K          252 254       5B      INSTACK     EXITS
  243  30       I          281 292      32B                EXT REFS  NOT INNER
  246  25       J          282 283       2B      INSTACK
  261  27       K          287 289       5B      INSTACK     EXITS
  301  40       I          298 309      32B                EXT REFS  NOT INNER
  304  35       J          299 300       2B      INSTACK
  317  37       K          304 306       5B      INSTACK     EXITS
  343  42       I          316 322      10B        OPT
  360  46       K          324 332      25B                EXT REFS  NOT INNER
  365  44       J          325 327       3B      INSTACK
  377  45       J          329 331       3B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTSH          3              0 KTSH    (1)          1 LTSH    (1)          2 TSH     (1)
       CTSHFO        2              0 LTSHFO  (1)          1 TSHFO   (1)
       CONSTS        2              0 NO      (1)          1 YES     (1)
       CFMTA         1              0 FMTA    (1)
       COMRWP        3              0 ITAPER  (1)          1 ITAPEW  (1)          2 ITAPEP  (1)
       KLUES        24              0 KLUSE   (1)          1 KLUNAL  (1)          2 IRED    (1)
                                    3 KLUMD   (1)          4 KLUBAL  (1)          5 MSADD   (1)
                                    6 NPASS   (1)          7 IDNOPT  (1)          8 VDES    (1)
                                    9 EPS1    (1)         10 DWMAX   (1)         11 NBAR    (1)
                                   12 NFIX    (1)         13 D       (1)         14 DEL     (1)
                                   15 EPS2    (1)         16 NCYC    (1)         17 NNN     (1)
                                   18 IBAND   (1)         19 IFIN    (1)         20 KLUB    (1)
                                   21 KLUQ    (1)         22 MORBAL  (1)         23 DBAL    (1)
       PLUG        129              0 EMP     (9)          9 PHP     (120)
       KLUFF         1              0 KFREE   (1)
       PLAYFF       26              0 IUMDFF  (1)          1 IFMDFF  (1)          2 IUDLTI  (1)
                                    3 IFDLTI  (1)          4 IUSLTI  (1)          5 IFSLTI  (1)
                                    6 IUMPLI  (1)          7 IFMPLI  (1)          8 IUTPGT  (1)
```

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COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                9 IFTPGT (1)             10 IUPATF (1)             11 IFPATF (1)
                               12 IUMPL  (1)             13 IFMPL  (1)             14 IUSLT  (1)
                               15 IFSLT  (1)             16 IUDLT  (1)             17 IFDLT  (1)
                               18 IUQA   (1)             19 IFQA   (1)             20 IUQAT  (1)
                               21 IFQAT  (1)             22 IUPHA  (1)             23 IFPHA  (1)
                               24 IUPHAT (1)             25 IFPHAT (1)
   PLACES           98          0 IUIN1  (1)              1 IUIN2  (1)              2 IUOUT1 (1)
                                3 IUOUT2 (1)              4 IUGO1  (1)              5 IUGO2  (1)
                                6 IUGO3  (1)              7 IUGO4  (1)              8 IUSCR  (1)
                                9 IFSCR  (1)             10 IFS1   (1)             11 IFS2   (1)
                               12 IFS3   (1)             13 IFS4   (1)             14 IUCD   (1)
                               15 IUPR   (1)             16 IUA    (1)             17 IFA    (1)
                               18 IUY    (1)             19 IFY    (1)             20 IUMEMN (1)
                               21 IFMEMN (1)             22 IUSTFN (1)             23 IFSTFN (1)
                               24 IUKS   (1)             25 IFKS   (1)             26 IUB    (1)
                               27 IFB    (1)             28 IUDESO (1)             29 IFDESO (1)
                               30 IUMDBI (1)             31 IFMDBI (1)             32 IUADDI (1)
                               33 IFADDI (1)             34 IUBALI (1)             35 IFBALI (1)
                               36 IUDESI (1)             37 IFDESI (1)             38 IUWTI  (1)
                               39 IFWTI  (1)             40 IUMEMO (1)             41 IFMEMO (1)
                               42 IUBT   (1)             43 IFBT   (1)             44 IUDESN (1)
                               45 IFDESN (1)             46 IUMD   (1)             47 IFMD   (1)
                               48 IUMEMF (1)             49 IFMEMF (1)             50 IUSTFO (1)
                               51 IFSTFO (1)             52 IUMDB  (1)             53 IFMDB  (1)
                               54 IUADD  (1)             55 IFADD  (1)             56 IUBAL  (1)
                               57 IFBAL  (1)             58 IUDESF (1)             59 IFDESF (1)
                               60 IUWT   (1)             61 IFWT   (1)             62 IUDUM1 (1)
                               63 IFDUM1 (1)             64 IUDUM2 (1)             65 IFDUM2 (1)
                               66 IUDUM3 (1)             67 IFDUM3 (1)             68 IUL    (1)
                               69 IFL    (1)             70 IUYT   (1)             71 IFYT   (1)
                               72 IUZ    (1)             73 IFZ    (1)             74 IUZR   (1)
                               75 IFZR   (1)             76 IULR   (1)             77 IFLR   (1)
                               78 IUBR   (1)             79 IFBR   (1)             80 IUPHTF (1)
                               81 IFPHTF (1)             82 IUMODM (1)             83 IFMODM (1)
                               84 IUMODK (1)             85 IFMODK (1)             86 IUPHT  (1)
                               87 IFPHT  (1)             88 IUQT   (1)             89 IFQT   (1)
                               90 IUQ    (1)             91 IFQ    (1)             92 IUPH   (1)
                               93 IFPH   (1)             94 IUINCM (1)             95 IFINCM (1)
                               96 IUINCK (1)             97 IFINCK (1)
   FLUT            204          0 UMOD   (80)            80 VMOD   (80)           160 VF     (1)
                              161 WW     (1)            162 CSCL   (1)            163 NMODE  (1)
                              164 IDMODE (40)
   COLS             22          0 IT     (1)              1 IMINT  (1)              2 IMAXT  (1)
                                3 IDENS  (1)              4 IOLDT  (1)              5 IOLDW  (1)
                                6 ISRAT  (1)              7 IMINTO (1)              8 IINITT (1)
                                9 IWPUT  (1)             10 NVAR   (1)             11 JWPUT  (1)
                               12 JINITT (1)             13 JMINT  (1)             14 JMAXT  (1)
                               15 JOLDT  (1)             16 JNEWT  (1)             17 JDRV   (1)
                               18 JDRVO  (1)             19 JSPR1  (1)             20 JSPR2  (1)
                               21 JSPR3  (1)
   FILE             20          0 IPOS   (20)
   WAYTS             6          0 WINITT (1)              1 WST    (1)              2 WMB    (1)
                                3 WBOTH  (1)              4 WPRES  (1)              5 DW     (1)
   CORE              2          0 KORE   (1)              1 KOREDP (1)
   CLIST            11          0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
                                6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG (1)
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COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                    9 KOUNTH (1)             10 KOUNTI (1)
      CLUFO         21              0 LKLUFO (1)              1 KLUFO  (20)
      STORES       277              0 NUMSTR (1)              1 KCONST (1)             2 ISTDOF (30)
                                   32 IDYDOF (30)            62 IDSTR  (5)            67 STRWI  (5)
                                   72 STRWO  (5)             77 STRWN  (5)            82 STRII  (15)
                                   97 STRIO  (15)           112 STRIN  (15)          127 STRRI  (15)
                                  142 STRRO  (15)           157 STRRN  (15)          172 STRWDO (5)
                                  177 STRWDN (5)            182 STRIDO (15)          197 STRIDN (15)
                                  212 STRRDO (15)           227 STRRDN (15)          242 SCALE  (35)
      STRCLU        10              0 ICYCLE (1)              1 ISTEP  (1)             2 M1     (1)
                                    3 M2     (1)              4 M3     (1)             5 M4     (1)
                                    6 VS     (1)              7 VOLD   (1)             8 VNEW   (1)
                                    9 STPOLD (1)
      LOCSTR         6              0 IUSTRI (1)              1 IFSTRI (1)             2 IUMREF (1)
                                    3 IFMREF (1)              4 IUMOD  (1)             5 IFMOD  (1)
      FITR          41              0 NOMI   (1)              1 NIND   (40)
      QELIM          3              0 QDW    (1)              1 VQDW   (1)             2 LC38   (1)

STATISTICS
  PROGRAM LENGTH                 12063B    5171
  CM LABELED COMMON LENGTH        1620B     912
          52000B CM USED
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```
      C                                                                   TAFOM    2
      C45700. SUB. TAFOM (TITLE FOR AUTOMATED FLUTTER OPTIMIZATION MODULE) TAFOM    3
      C                                                                   TAFOM    4
      C*********************************************************************** TAFOM    5
      C                                                                 * TAFOM    6
      C***  SUBROUTINE TAFOM  ******************************************** TAFOM    7
      C                                                                 * TAFOM    8
      C***  OBJECTIVE  ************************************************** TAFOM    9
      C     ---------                                                   * TAFOM   10
      C     PRINTS THE TITLE PAGE FOR THE AUTOMATED FLUTTER OPTIMIZATION * TAFOM   11
      C     MODULE                                                      * TAFOM   12
      C                                                                 * TAFOM   13
      C*********************************************************************** TAFOM   14
      C                                                                   TAFOM   15
            SUBROUTINE TAFOM (KALGOR)                                     TAFOM   16
      C                                                                   TAFOM   17
            DIMENSION AFFDL(4)                                            TAFOM   18
      C                                                                   TAFOM   19
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                          TAFOM   20
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE TAFOM   21
           1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                  TAFOM   22
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA TAFOM   23
           1                ,ITAPET                                       TAFOM   24
            COMMON /CAFFDL/ AFFDL                                         TAFOM   25
      C                                                                   TAFOM   26
      C                                                                   TAFOM   27
      C PREPARE TABLE OF CONTENTS                                         TAFOM   28
      C                                                                   TAFOM   29
            KOUNT  =  LINES                                               TAFOM   30
            CALL TITLES (-1)                                              TAFOM   31
            NCOLS  =  0                                                   TAFOM   32
            NROWS  =  2                                                   TAFOM   33
            KTABLE =  2                                                   TAFOM   34
            CALL PTABLE (1,60,60                                          TAFOM   35
           *   H ***    ****     ***    *   *                          ) TAFOM   36
            NROWS  =  0                                                   TAFOM   37
            KTABLE =  2                                                   TAFOM   38
            CALL PTABLE (1,60,60                                          TAFOM   39
           *   H*    * - *       *   *   ** **        AUTOMATED        ) TAFOM   40
            KTABLE =  2                                                   TAFOM   41
            CALL PTABLE (1,60,60                                          TAFOM   42
           *'  H*****   ****  - *   * - * * *          FLUTTER         ) TAFOM   43
            KTABLE =  2                                                   TAFOM   44
            CALL PTABLE (1,60,60                                          TAFOM   45
           *   H*    *   *       *   *   * * *       OPTIMIZATION      ) TAFOM   46
            KTABLE =  2                                                   TAFOM   47
            CALL PTABLE (2,60,60                                          TAFOM   48
           *   H*    *   *      ***     * * *           MODULE         ) TAFOM   49
            KOUNT  =  LINES                                               TAFOM   50
      C                                                                   TAFOM   51
      C                                                                   TAFOM   52
      C PREPARE TABLE OF CONTENTS FOR OPTIMIZATION ALGORITHM              TAFOM   53
      C                                                                   TAFOM   54
            NROWS  =  2                                                   TAFOM   55
            NCOLS  =  0                                                   TAFOM   56
            KTABLE =  2                                                   TAFOM   57
            NPAGEA =  1                                                   TAFOM   58
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      IF (KALGOR .EQ. 1) CALL PTABLE (2,50,50                           TAFOM
     1   HBEGIN VELOCITY DERIVATIVE RATIO ALGORITHM - V.D.R.)           TAFOM
      KOUNT  =  LINES                                                   TAFOM
C                                                                       TAFOM
C                                                                       TAFOM
C LIST TITLE PAGE                                                       TAFOM
C                                                                       TAFOM
      WRITE (ITAPEW,100)                                                TAFOM
      WRITE (ITAPEW,105)                                                TAFOM
      WRITE (ITAPEW,110)                                                TAFOM
      WRITE (ITAPEW,115)                                                TAFOM
      WRITE (ITAPEW,120) AFFDL                                          TAFOM
      WRITE (ITAPEW,125)                                                TAFOM
      WRITE (ITAPEW,130)                                                TAFOM
      WRITE (ITAPEW,135)                                                TAFOM
      WRITE (ITAPEW,140)                                                TAFOM
      WRITE (ITAPEW,145)                                                TAFOM
      WRITE (ITAPEW,150)                                                TAFOM
      WRITE (ITAPEW,155)                                                TAFOM
      WRITE (ITAPEW,160)                                                TAFOM
      WRITE (ITAPEW,165)                                                TAFOM
      WRITE (ITAPEW,170)                                                TAFOM
      WRITE (ITAPEW,175)                                                TAFOM
  100 FORMAT (                                                          TAFOM
     *    5X,122(1H*)                                                   TAFOM
     *,/, 5X,1H*,120X,1H*                                               TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H      A                                                       TAFOM
     *,52X, 36H....................................,4X,1H*             TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H     AAA                                                      TAFOM
     *,52X, 36H.                                  .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H    AAAAA                                                     TAFOM
     *,52X, 36H.         **** FASTOP ****         .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H    AAAAA                                                     TAFOM
     *,52X, 36H.      FLUTTER AND STRUCTURAL      .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H   AAA AAA                                                    TAFOM
     *,52X, 36H.       OPTIMIZATION PROGRAM       .,4X,1H*)             TAFOM
  105 FORMAT (                                                          TAFOM
     *    5X,1H*,15X                                                    TAFOM
     A,13H   AAA AAA                                                    TAFOM
     *,52X, 36H.                                  .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H   AAA AAA                                                    TAFOM
     *,52X, 36H.          **** FOP ****           .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H   AAA AAA                                                    TAFOM
     *,52X, 36H.   FLUTTER OPTIMIZATION PACKAGE   .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H   AAA AAA                                                    TAFOM
     *,52X, 36H.                                  .,4X,1H*              TAFOM
     *,/, 5X,1H*,15X                                                    TAFOM
     A,13H  AAAAAAAAA                                                   TAFOM
     *,52X, 36H.          **** AFOM ****          .,4X,1H*)             TAFOM
```

```
      110 FORMAT (                                                       TAFOM    116
         *     5X,1H*,15X                                                TAFOM    117
         A,13H  AAAAAAAAA                                                TAFOM    118
         *,13X                                                           TAFOM    119
         F,13HFFFFFFFFFFFFFF                                             TAFOM    120
         *,26X, 36H.              AUTOMATED                ..,4X,1H*     TAFOM    121
         *,/, 5X,1H*,15X                                                 TAFOM    122
         A,13H  AAAA AAAA                                                TAFOM    123
         *,13X                                                           TAFOM    124
         F,13HFFFFFFFFFFFFF                                              TAFOM    125
         *,26X, 36H.   FLUTTER OPTIMIZATION MODULE         ..,4X,1H*     TAFOM    126
         *,/, 5X,1H*,15X                                                 TAFOM    127
         A,13H  AAA    AAA                                               TAFOM    128
         *,13X                                                           TAFOM    129
         F,13H FFF      FFF                                              TAFOM    130
         *,26X, 36H.                                       ..,4X,1H*)    TAFOM    131
      115 FORMAT (                                                       TAFOM    132
         *     5X,1H*,15X                                                TAFOM    133
         A,13H  AAA    AAA                                               TAFOM    134
         *,13X                                                           TAFOM    135
         F,13H FFF      FFF                                              TAFOM    136
         *,26X, 36H.....................................,4X,1H*         TAFOM    137
         *,/, 5X,1H*,15X                                                 TAFOM    138
         A,13H AAA      AAA                                              TAFOM    139
         *,13X                                                           TAFOM    140
         F,13H FFF                                                       TAFOM    141
         *,26X, 36H.                                        .,4X,1H*     TAFOM    142
         *,/, 5X,1H*,15X                                                 TAFOM    143
         A,13H AAA      AAA                                              TAFOM    144
         *,13X                                                           TAFOM    145
         F,13H FFF                                                       TAFOM    146
         *,26X, 36H.              AIR FORCE                ..,4X,1H*)    TAFOM    147
      120 FORMAT (                                                       TAFOM    148
         *     5X,1H*,15X                                                TAFOM    149
         A,13H AAA      AAA                                              TAFOM    150
         *,13X                                                           TAFOM    151
         F,13H FFF                                                       TAFOM    152
         *,26X, 36H.    FLIGHT DYNAMICS LABORATORY         ..,4X,1H*     TAFOM    153
         *,/, 5X,1H*,15X                                                 TAFOM    154
         A,13HAAA        AAA                                             TAFOM    155
         *,13X                                                           TAFOM    156
         F,13H FFF                                                       TAFOM    157
         *,26X, 36H.                                       ..,4X,1H*     TAFOM    158
         *,/, 5X,1H*,15X                                                 TAFOM    159
         A,13HAAA        AAA                                             TAFOM    160
         *,13X                                                           TAFOM    161
         F,13H FFF                                                       TAFOM    162
         *,26X, 10H.          ,4A4, 10H          ..,4X,1H*)              TAFOM    163
      125 FORMAT (                                                       TAFOM    164
         *     5X,1H*,15X                                                TAFOM    165
         A,13HAAA        AAA                                             TAFOM    166
         *,13X                                                           TAFOM    167
         F,13H FFFFFFFFF                                                 TAFOM    168
         *,26X, 36H.                                       ..,4X,1H*     TAFOM    169
         *,/, 5X,1H*,41X                                                 TAFOM    170
         F,13H FFFFFFFFF                                                 TAFOM    171
         *,13X                                                           TAFOM    172
```

```
     0,13H   0000000                                                TAFOM    173
     *,      36H.................................. ,4X,1H*         TAFOM    174
     *,/, 5X,1H*,41X                                                TAFOM    175
     F,13H FFF                                                      TAFOM    176
     *,13X                                                          TAFOM    177
     0,13H  000000000                                               TAFOM    178
     *,40X,1H*)                                                     TAFOM    179
 130 FORMAT (                                                       TAFOM    180
     *     5X,1H*,41X                                               TAFOM    181
     F,13H FFF                                                      TAFOM    182
     *,13X                                                          TAFOM    183
     0,13H 0000   0000                                              TAFOM    184
     *,40X,1H*                                                      TAFOM    185
     *,/, 5X,1H*,41X                                                TAFOM    186
     F,13H FFF                                                      TAFOM    187
     *,13X                                                          TAFOM    188
     0,13H000        000                                            TAFOM    189
     *,40X, 1H*                                                     TAFOM    190
     *,/, 5X,1H*,41X                                                TAFOM    191
     F,13H FFF                                                      TAFOM    192
     *,13X                                                          TAFOM    193
     0,13H000        000                                            TAFOM    194
     *,40X,1H*)                                                     TAFOM    195
 135 FORMAT (                                                       TAFOM    196
     *     5X,1H*,41X                                               TAFOM    197
     F,13H FFF                                                      TAFOM    198
     *,13X                                                          TAFOM    199
     0,13H000        000                                            TAFOM    200
     *,40X,1H*                                                      TAFOM    201
     *,/, 5X,1H*,41X                                                TAFOM    202
     F,13H FFF                                                      TAFOM    203
     *,13X                                                          TAFOM    204
     0,13H000        000                                            TAFOM    205
     *,40X,1H*                                                      TAFOM    206
     *,/, 5X,1H*,41X                                                TAFOM    207
     F,13H FFF                                                      TAFOM    208
     *,13X                                                          TAFOM    209
     0,13H000        000                                            TAFOM    210
     *,40X,1H*)                                                     TAFOM    211
 140 FORMAT (                                                       TAFOM    212
     *     5X,1H*,41X                                               TAFOM    213
     F,13HFFFF                                                      TAFOM    214
     *,13X                                                          TAFOM    215
     0,13H000        000                                            TAFOM    216
     *,40X,1H*                                                      TAFOM    217
     *,/, 5X,1H*,41X                                                TAFOM    218
     F,13HFFFF                                                      TAFOM    219
     *,13X                                                          TAFOM    220
     0,13H000        000                                            TAFOM    221
     *,40X,1H*                                                      TAFOM    222
     *,/, 5X,1H*,67X                                                TAFOM    223
     0,13H000        000                                            TAFOM    224
     *,13X                                                          TAFOM    225
     M,13HMMM        MMM                                            TAFOM    226
     *,14X,1H*)                                                     TAFOM    227
 145 FORMAT (                                                       TAFOM    228
     *     5X,1H*,2X                                                TAFOM    229
```

```
     *,65X                                                              TAFOM    230
     0,13H000        000                                                TAFOM    231
     *,13X                                                              TAFOM    232
     M,13HMMM        MMM                                                TAFOM    233
     *,14X,1H*                                                          TAFOM    234
     *,/, 5X,1H*,2X                                                     TAFOM    235
     *,65X                                                              TAFOM    236
     0,13H000        000                                                TAFOM    237
     *,13X                                                              TAFOM    238
     M,13HMMMM      MMMM                                                TAFOM    239
     *,14X,1H*                                                          TAFOM    240
     *,/, 5X,1H*,2X                                                     TAFOM    241
     * 65X                                                              TAFOM    242
     0,13H000        000                                                TAFOM    243
     *,13X                                                              TAFOM    244
     M,13HMMMM      MMMM                                                TAFOM    245
     *,14X, 1H*)                                                        TAFOM    246
 150 FORMAT (                                                           TAFOM    247
     *     5X,1H*,2X                                                    TAFOM    248
     *,65X                                                              TAFOM    249
     0,13H000        000                                                TAFOM    250
     *,13X                                                              TAFOM    251
     M,13HMMMMM    MMMMM                                                TAFOM    252
     *,14X,1H*                                                          TAFOM    253
     *,/, 5X,1H*,2X                                                     TAFOM    254
     *,65X                                                              TAFOM    255
     0,13H000        000                                                TAFOM    256
     *,13X                                                              TAFOM    257
     M,13HMMMMM    MMMMM                                                TAFOM    258
     *,14X,1H*                                                          TAFOM    259
     *,/, 5X,1H*,2X                                                     TAFOM    260
     *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG,1X          TAFOM    261
     0,13H000        000                                                TAFOM    262
     *,13X                                                              TAFOM    263
     M,13HMMMMM    MMMMM                                                TAFOM    264
     *,14X,1H*)                                                         TAFOM    265
 155 FORMAT (                                                           TAFOM    266
     *     5X,1H*,2X                                                    TAFOM    267
     *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG      ,1X          TAFOM    268
     0,13H 0000   0000                                                  TAFOM    269
     *,13X                                                              TAFOM    270
     M,13HMMMMMMM MMMMMM                                                TAFOM    271
     *,14X,1H*                                                          TAFOM    272
     *,/, 5X,1H*,2X                                                     TAFOM    273
     *,24X,      40H  GGGGGGGGGGGGGGGGGGGGGGGGGGG          ,1X          TAFOM    274
     0,13H  000000000                                                   TAFOM    275
     *,13X                                                              TAFOM    276
     M,13HMMM MM MM MMM                                                 TAFOM    277
     *,14X,1H*                                                          TAFOM    278
     *,/, 5X,1H*,2X                                                     TAFOM    279
     *,24X,      40H   GGGGGGGGGGGGGGGGGGGG                 ,1X          TAFOM    280
     0,13H   0000000                                                    TAFOM    281
     *,13X                                                              TAFOM    282
     M,13HMMM MM MM MMM                                                 TAFOM    283
     *,14X,1H*)                                                         TAFOM    284
 160 FORMAT (                                                           TAFOM    285
     *     5X,1H*,2X                                                    TAFOM    286
```

```
     *,5X,   15H               ,4X                                    TAFOM     287
     *,             40H    GGGGGGGGGGGGGGGG                   ,1X     TAFOM     288
     *,26X                                                            TAFOM     289
     M,13HMMM MMMMM MMM                                               TAFOM     290
     *,14X,1H*                                                        TAFOM     291
     *,/, 5X,1H*,2X                                                   TAFOM     292
     *,5X,   15H                 ,4X                                  TAFOM     293
     *,             40H   GGGGGGGGGGGGGGG                     ,1X     TAFOM     294
     *,26X                                                            TAFOM     295
     M,13HMMM MMMMM MMM                                               TAFOM     296
     *,14X,1H*                                                        TAFOM     297
     *,/, 5X,1H*,2X                                                   TAFOM     298
     *,5X,   15H    GRUMMAN    ,4X                                    TAFOM     299
     *,             40H  GGGGGGGGGGGGGG                       ,1X     TAFOM     300
     *,26X                                                            TAFOM     301
     M,13HMMM  MMM  MMM                                               TAFOM     302
     *,14X,1H*)                                                       TAFOM     303
 165 FORMAT (                                                         TAFOM     304
     *     5X,1H*,2X                                                  TAFOM     305
     *,5X,   15H.  AEROSPACE   ,4X                                    TAFOM     306
     *,             40H  GGGGGGGGGGGG                         ,1X     TAFOM     307
     *,26X                                                            TAFOM     308
     M,13HMMM  MMM  MMM                                               TAFOM     309
     *,14X,1H*                                                        TAFOM     310
     *,/, 5X,1H*,2X                                                   TAFOM     311
     *,5X,   15H. CORPORATION ..,4X                                   TAFOM     312
     *,             40H  GGGGGGGGGG                           ,1X     TAFOM     313
     *,26X                                                            TAFOM     314
     M,13HMMM  MMM  MMM                                               TAFOM     315
     *,14X,1H*                                                        TAFOM     316
     *,/, 5X,1H*,2X                                                   TAFOM     317
     *,5X,   15H.            ..,4X                                    TAFOM     318
     *,             40H  GGGGGGGG                             ,1X     TAFOM     319
     *,26X                                                            TAFOM     320
     M,13HMMM  MMM  MMM                                               TAFOM     321
     *,14X,1H*)                                                       TAFOM     322
 170 FORMAT (  5X, 1H*, 2X                                            TAFOM     323
     *,5X,   15H................,4X                                   TAFOM     324
     *,             40H  GGGGGG                               ,1X     TAFOM     325
     *,26X                                                            TAFOM     326
     M,13HMMM  MMM  MMM                                               TAFOM     327
     *,14X,1H*                                                        TAFOM     328
     *,/, 5X,1H*,2X                                                   TAFOM     329
     *,24X,         40H  GGGG                                 ,1X     TAFOM     330
     *,26X                                                            TAFOM     331
     M,13HMMM  MMM  MMM                                               TAFOM     332
     *,14X,1H*                                                        TAFOM     333
     *,/, 5X,1H*,2X                                                   TAFOM     334
     *,24X,         40H  GG                                   ,1X     TAFOM     335
     *,26X                                                            TAFOM     336
     M,13HMMM  MMM  MMM                                               TAFOM     337
     *,14X,1H*                                                        TAFOM     338
     *,/, 5X,1H*,2X                                                   TAFOM     339
     *,24X,         40H  G                                    ,1X     TAFOM     340
     *,26X                                                            TAFOM     341
     M,13HMMM  MMM  MMM       ,14X,1H*)                               TAFOM     342
 175 FORMAT ( 5X,1H*,120X,1H*,/,5X,122(1H*))                          TAFOM     343
```

```
VARIABLES      SN  TYPE            RELOCATION
   46  IUWTI       INTEGER              PLACES       REFS        24
   22  IUY         INTEGER              PLACES       REFS        24
  106  IUYT        INTEGER              PLACES       REFS        24
  110  IUZ         INTEGER              PLACES       REFS        24
  112  IUZR        INTEGER              PLACES       REFS        24
   11  IWPUT       INTEGER              COLS         REFS        50
   21  JDRV        INTEGER              COLS         REFS        50
   22  JDRVO       INTEGER              COLS         REFS        50
   14  JINITT      INTEGER              COLS         REFS        50
   16  JMAXT       INTEGER              COLS         REFS        50
   15  JMINT       INTEGER              COLS         REFS        50
   20  JNEWT       INTEGER              COLS         REFS        50
   17  JOLDT       INTEGER              COLS         REFS        50
   23  JSPR1       INTEGER              COLS         REFS        50
   24  JSPR2       INTEGER              COLS         REFS        50
   25  JSPR3       INTEGER              COLS         REFS        50
   13  JWPUT       INTEGER              COLS         REFS        50
    7  KBPAGE      INTEGER              CLIST        REFS        68
    0  KFREE       INTEGER              KLUFF        REFS        42
    4  KLABEL      INTEGER              CLIST        REFS        68
   24  KLUB        INTEGER              KLUES        REFS        47
    4  KLUBAL      INTEGER              KLUES        REFS        47
    :  KLUFO       INTEGER    ARRAY     CLUFO        REFS        41
    3  KLUMD       INTEGER              KLUES        REFS        47
    1  KLUNAL      INTEGER              KLUES        REFS        47
   25  KLUQ        INTEGER              KLUES        REFS        47
    0  KLUSE       INTEGER              KLUES        REFS        47
    0  KOUNT       INTEGER              CLIST        REFS        68
   11  KOUNTH      INTEGER              CLIST        REFS        68
   12  KOUNTI      INTEGER              CLIST        REFS        68
    1  KPAGE       INTEGER              CLIST        REFS        68
    5  KTPAGE      INTEGER              CLIST        REFS        68
    2  LINES       INTEGER              CLIST        REFS        68
   10  LINESG      INTEGER              CLIST        REFS        68
    3  LINEST      INTEGER              CLIST        REFS        68
    0  LKLUFO      INTEGER              CLUFO        REFS        41
  121  MBDOF       INTEGER    ARRAY     BAL          REFS        57
  350  MES         INTEGER    ARRAY                  REFS        12     DEFINED      71
  307  MESTYP      INTEGER                        DEFINED        79        80
   26  MORBAL      INTEGER              KLUES        REFS        47
    5  MSADD       INTEGER              KLUES        REFS        47
  346  NAME        INTEGER   *UNDEF                  REFS        10
   13  NBAR        INTEGER              KLUES        REFS        47
    0  NBYTES      INTEGER              CBYTES       REFS        55
   20  NCYC        INTEGER              KLUES        REFS        47        80
   14  NFIX        INTEGER              KLUES        REFS        47
    0  NMBAL       INTEGER              BAL          REFS        57
  243  NMODE       INTEGER              FLUT         REFS        56
   21  NNN         INTEGER              KLUES        REFS        47
    6  NPAGE       INTEGER              CLIST        REFS        68
    6  NPASS       INTEGER              KLUES        REFS        47
    0  NROWS       INTEGER               F.P.        REFS        2*9      426     DEFINED      1
  310  NTYME     * INTEGER                        DEFINED       101
  311  NU        * INTEGER                        DEFINED       102
  312  NV        * INTEGER                        DEFINED       103
   12  NVAR        INTEGER              COLS         REFS        50
  3:5  ROE         REAL      *UNDEF                  REFS        10        14
```

VARIABLES		SN	TYPE	RELOCATION			
70	IUBAL		INTEGER	PLACES	REFS	24	
42	IUBALI		INTEGER	PLACES	REFS	24	
116	IUBR		INTEGER	PLACES	REFS	24	
52	IUBT		INTEGER	PLACES	REFS	24	
16	IUCD		INTEGER	PLACES	REFS	24	
313	IUCOM		INTEGER		DEFINED	104	106
72	IUDESF		INTEGER	PLACES	REFS	24	
44	IUDESI		INTEGER	PLACES	REFS	24	
54	IUDESN		INTEGER	PLACES	REFS	24	
34	IUDESO		INTEGER	PLACES	REFS	24	
20	IUDLT		INTEGER	PLAYFF	REFS	43	
2	IUDLTI		INTEGER	PLAYFF	REFS	43	
76	IUDUM1		INTEGER	PLACES	REFS	24	
100	IUDUM2		INTEGER	PLACES	REFS	24	
102	IUDUM3		INTEGER	PLACES	REFS	24	
4	IUGO1		INTEGER	PLACES	REFS	24	
5	IUGO2		INTEGER	PLACES	REFS	24	
6	IUGO3		INTEGER	PLACES	REFS	24	
7	IUGO4		INTEGER	PLACES	REFS	24	
140	IUINCK		INTEGER	PLACES	REFS	24	
136	IUINCM		INTEGER	PLACES	REFS	24	
0	IUIN1		INTEGER	PLACES	REFS	24	
1	IUIN2		INTEGER	PLACES	REFS	24	
30	IUKS		INTEGER	PLACES	REFS	24	
104	IUL		INTEGER	PLACES	REFS	24	
114	IULR		INTEGER	PLACES	REFS	24	
56	IUMD		INTEGER	PLACES	REFS	24	
64	IUMDB		INTEGER	PLACES	REFS	24	
36	IUMDBI		INTEGER	PLACES	REFS	24	
0	IUMDFF		INTEGER	PLAYFF	REFS	43	
60	IUMEMF		INTEGER	PLACES	REFS	24	
24	IUMEMN		INTEGER	PLACES	REFS	24	
50	IUMEMO		INTEGER	PLACES	REFS	24	
124	IUMODK		INTEGER	PLACES	REFS	24	
122	IUMODM		INTEGER	PLACES	REFS	24	
14	IUMPL		INTEGER	PLAYFF	REFS	43	
6	IUMPLI		INTEGER	PLAYFF	REFS	43	
2	IUOUT1		INTEGER	PLACES	REFS	24	
3	IUOUT2		INTEGER	PLACES	REFS	24	
12	IUPATF		INTEGER	PLAYFF	REFS	43	
134	IUPH		INTEGER	PLACES	REFS	24	106
26	IUPHA		INTEGER	PLAYFF	REFS	43	
30	IUPHAT		INTEGER	PLAYFF	REFS	43	
126	IUPHT		INTEGER	PLACES	REFS	24	
120	IUPHTF		INTEGER	PLACES	REFS	24	
17	IUPR		INTEGER	PLACES	REFS	24	
132	IUQ		INTEGER	PLACES	REFS	24	104
22	IUQA		INTEGER	PLAYFF	REFS	43	
24	IUQAT		INTEGER	PLAYFF	REFS	43	
130	IUQT		INTEGER	PLACES	REFS	24	
10	IUSCR		INTEGER	PLACES	REFS	24	
16	IUSLT		INTEGER	PLAYFF	REFS	43	
4	IUSLTI		INTEGER	PLAYFF	REFS	43	
26	IUSTFN		INTEGER	PLACES	REFS	24	
62	IUSTFO		INTEGER	PLACES	REFS	24	
10	IUTPGT		INTEGER	PLAYFF	REFS	43	
74	IUWT		INTEGER	PLACES	REFS	24	

```
VARIABLES      SN  TYPE              RELOCATION
   141  IFINCK     INTEGER              PLACES      REFS        24
   137  IFINCM     INTEGFR              PLACES      REFS        24
    31  IFKS       INTEGER              PLACES      REFS        24
   10-  IFL        INTEGER              PLACES      REFS        24
   115  IFLR       INTEGER              PLACES      REFS        24
    57  IFMD       INTEGER              PLACES      REFS        24
    65  IFMDB      INTEGER              PLACES      REFS        24
    37  IFMDBI     INTEGER              PLACES      REFS        24
     1  IFMDFF     INTEGER              PLAYFF      REFS        43
    61  IFMEMF     INTEGER              PLACES      REFS        24
    25  IFMEMN     INTEGER              PLACES      REFS        24
    51  IFMEMO     INTEGER              PLACES      REFS        24
   125  IFMODK     INTEGER              PLACES      REFS        24
   123  IFMODM     INTEGER              PLACES      REFS        24
    15  IFMPL      INTEGER              PLAYFF      REFS        43
     7  IFMPLI     INTEGER              PLAYFF      REFS        43
    13  IFPATF     INTEGER              PLAYFF      REFS        43
   135  IFPH       INTEGER              PLACES      REFS        24       107
    27  IFPHA      INTEGER              PLAYFF      REFS        43
    31  IFPHAT     INTEGER              PLAYFF      REFS        43
   127  IFPHT      INTEGER              PLACES      REFS        24
   121  IFPHTF     INTEGER              PLACES      REFS        24
   133  IFQ        INTEGER              PLACES      REFS        24       105
    23  IFQA       INTEGER              PLAYFF      REFS        43
    25  IFQAT      INTEGER              PLAYFF      REFS        43
   131  IFQT       INTEGER              PLACES      REFS        24
    11  IFSCR      INTEGER              PLACES      REFS        24
    17  IFSLT      INTEGER              PLAYFF      REFS        43
     5  IFSLTI     INTEGER              PLAYFF      REFS        43
    27  IFSTFN     INTEGER              PLACES      REFS        24
    63  IFSTFO     INTEGER              PLACES      REFS        24
    12  IFS1       INTEGER              PLACES      REFS        24
    13  IFS2       INTEGER              PLACES      REFS        24
    14  IFS3       INTEGER              PLACES      REFS        24
    15  IFS4       INTEGER              PLACES      REFS        24
    11  IFTPGT     INTEGER              PLAYFF      REFS        43
    75  IFWT       INTEGER              PLACES      REFS        24
    47  IFWTI      INTEGER              PLACES      REFS        24
    23  IFY        INTEGER              PLACES      REFS        24
   107  IFYT       INTEGER              PLACES      REFS        24
   111  IFZ        INTEGER              PLACES      REFS        24
   113  IFZR       INTEGER              PLACES      REFS        24
    10  IINITT     INTEGER              COLS        REFS        50
     2  IMAXT      INTEGER              COLS        REFS        50
     1  IMINT      INTEGER              COLS        REFS        50
     7  IMINTO     INTEGER              COLS        REFS        50
     4  IOLDT      INTEGER              COLS        REFS        50
     5  IOLDW      INTEGER              COLS        REFS        50
     0  IPOS       INTEGER   ARRAY      FILE        REFS        11        54
     2  IRED       INTEGER              KLUES       REFS        47       106        107
   315  IROE       INTEGER   *UNDEF                 REFS        14
     6  ISRAT      INTEGER              COLS        REFS        50
     0  IT         INTEGER              COLS        REFS        50
    20  IUA        INTEGER              PLACES      REFS        24
    66  IUADD      INTEGER              PLACES      REFS        24
    40  IUADDI     INTEGER              PLACES      REFS        24
    32  IUB        INTEGER              PLACES      REFS        24
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                3      52H     U-REAL       U-IMAG        V-REAL       V-IMAG   ./)  DRVTV     458
            9008 FORMAT(20X,                                                         DRVTV     459
                1      52H************** RELATIVE DISPLACEMENTS **************,5X,   DRVTV     460
  460           2      52H************** ABSOLUTE DISPLACEMENTS **************./,    DRVTV     461
                3       10X, 5H  DOF,                                                DRVTV     462
                4 2(5X,52H     U-REAL       U-IMAG        V-REAL       V-IMAG   ),/) DRVTV     463
            9009 FORMAT(10X,I5,2(5X,1P4E13.4))                                       DRVTV     464
           C                                                                         DRVTV     465
  465            RETURN                                                              DRVTV     466
                 END                                                                 DRVTV     467
```

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      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DRVTV          1           465

VARIABLES      SN  TYPE            RELOCATION
  303  A        * COMPLEX   *UNDEF                  REFS        7
  305  B        * COMPLEX   *UNDEF                  REFS        7
    0  CHART      COMPLEX    ARRAY       F.P        REFS        7        9      426    DEFINED        1
  242  CSCL       REAL                   FLUT       REFS       56
   15  D          REAL                   KLUES      REFS       47
   27  DBAL       REAL                   KLUES      REFS       47
   16  DEL        REAL                   KLUES      REFS       47
  215  DRVMB      REAL       ARRAY       BAL        REFS       57
  241  DRVMBO     REAL       ARRAY       BAL        REFS       57
   12  DWMAX      REAL                   KLUES      REFS       47
   11  EPS1       REAL                   KLUES      REFS       47
   17  EPS2       REAL                   KLUES      REFS       47
   22  IBAND      INTEGER                KLUES      REFS       47
    1  IDBAL      INTEGER    ARRAY       BAL        REFS       57
    3  IDENS      INTEGER                COLS       REFS       50
  244  IDMODE     INTEGER    ARRAY       FLUT       REFS       56
    7  IDNOPT     INTEGER                KLUES      REFS       47
   21  IFA        INTEGER                PLACES     REFS       24
   67  IFADD      INTEGER                PLACES     REFS       24
   41  IFADDI     INTEGER                PLACES     REFS       24
   33  IFB        INTEGER                PLACES     REFS       24
   71  IFBAL      INTEGER                PLACES     REFS       24
   43  IFBALI     INTEGER                PLACES     REFS       24
  117  IFBR       INTEGER                PLACES     REFS       24
   53  IFBT       INTEGER                PLACES     REFS       24
  314  IFCOM      INTEGER                         DEFINED     105      107
   73  IFDESF     INTEGER                PLACES     REFS       24
   45  IFDESI     INTEGER                PLACES     REFS       24
   55  IFDESN     INTEGER                PLACES     REFS       24
   35  IFDESO     INTEGER                PLACES     REFS       24
   21  IFDLT      INTEGER                PLAYFF     REFS       43
    3  IFDLTI     INTEGER                PLAYFF     REFS       43
   77  IFDUM1     INTEGER                PLACES     REFS       24
  101  IFDUM2     INTEGER                PLACES     REFS       24
  103  IFDUM3     INTEGER                PLACES     REFS       24
   23  IFIN       INTEGER                KLUES      REFS       47
```

```
      C      LEFT=LINES-KOUNT                                      DRVTV     401
      C      IF(LEFT LT 3) KOUNT=LINES                             DRVTV     402
      C      CALL TITLES(2)                                        DRVTV     403
      C      WRITE(IUPR,9004)                                      DRVTV     404
      C      KOUNT=KOUNT+3                                         DRVTV     405
      C      GO TO 9999                                            DRVTV     406
      C                                                            DRVTV     407
      C 260 CONTINUE                                               DRVTV     408
      C      AVGO=SUMXO/N                                          DRVTV     409
      C      AVGN=SUMXN/N                                          DRVTV     410
      C      VARO=(SUMXO2/N)-(AVGO*AVGO)                           DRVTV     411
      C      VARN=(SUMXN2/N)-(AVGN*AVGN)                           DRVTV     412
      C      DEVO=SQRT(VARO)                                       DRVTV     413
      C      DEVN=SQRT(VARN)                                       DRVTV     414
      C      LEFT=LINES-KOUNT                                      DRVTV     415
      C      IF(LEFT.LT.7) KOUNT=LINES                             DRVTV     416
      C      CALL TITLES(2)                                        DRVTV     417
      C      WRITE(IUPR,9005) N,AVGO,DEVO,AVGN,DEVN                DRVTV     418
      C      KOUNT=KOUNT+7                                         DRVTV     419
      C                                                            DRVTV     420
      C9999 CONTINUE                                               DRVTV     421
      C                                                            DRVTV     422
      C  ****************************************************     DRVTV     423
      C  *       END OF CODE THAT HAS BEEN COMMENTED OUT      *     DRVTV     424
      C  *********************************************** ******     DRVTV     425
      C                                                            DRVTV     426
             CALL DRVSTR(CHART,VECTS,NROWS)                        DRVTV     427
             CALL PROGNA(4H(DRV,4HTV ))                            DRVTV     428
      C                                                            DRVTV     429
             CALL TIMEB(10,10HFROM DRVTV)                          DRVTV     430
             CALL MESAGE(2,5,5HDRVTV)                              DRVTV     431
      C                                                            DRVTV     432
       9000 FORMAT(/,10X,   30HFLUTTER VELOCITY DERIVATIVES, ,     DRVTV     433
          1                 25HSTRAIN ENERGY DENSITIES, ,          DRVTV     434
          2                 28HAND KINETIC ENERGY DENSITIES,3X,6A4, DRVTV    435
          3       //,10X,    6HMEMBER,15H     DERIVATIVE,5X,       DRVTV     436
          4                 30H           SED             KED ,/)  DRVTV     437
       9001 FORMAT(10X,I6, F15.4 ,5X,  2F15.4,/)                   DRVTV     438
       9002 FORMAT(/,10X,   46HDERIVATIVES, BEFORE AND AFTER FLUTTER REDESIGN, DRVTV  439
          1                 29H OF FLUTTER CRITICAL ELEMENTS,      DRVTV     440
          A       //,10X,   16HOLD DERIVATIVES ,6A4,               DRVTV     441
          B        /,10X,   16HNEW DERIVATIVES ,6A4,               DRVTV     442
          2       //,10X,    6HMEMBER,30H      OLD DERIV      NEW DERIV,/)  DRVTV  443
       9003 FORMAT(10X,I6,2F15.4,/)                                DRVTV     444
       9004 FORMAT(/,10X,   39HTHERE WERE NO FLUTTER CRITICAL ELEMENTS,/)  DRVTV  445
       9005 FORMAT(/,10X,   11HTHERE WERE ,I5,  26H FLUTTER CRITICAL ELEMENTS, DRVTV  446
          1                 30H IN THE LAST FLUTTER REDESIGN.,     DRVTV     447
          2       //,10X,   42HBEFORE REDESIGN, THE DERIVATIVES OF THESE ,  DRVTV  448
          3                 29HELEMENTS HAD A MEAN VALUE OF ,F10.4, DRVTV    449
          4                 29H AND A STANDARD DEVIATION OF ,F10.4, DRVTV    450
          5       //,10X,   41HAFTER REDESIGN, THE DERIVATIVES OF THESE ,  DRVTV  451
          6                 29HELEMENTS HAD A MEAN VALUE OF ,F10.4, DRVTV    452
          M                 29H AND A STANDARD DEVIATION OF ,F10.4,/)  DRVTV  453
       9006 FORMAT(/,10X,   44HFLUTTER VECTORS (U AND V) IN STRUCT. COORDS.,/) DRVTV  454
       9007 FORMAT(20X,                                            DRVTV     455
          1       52(1H*),/,                                       DRVTV     456
          2        10X, 5H  DOF,5X,                                DRVTV     457
```

```
C      KOUNT=LINES
C      SUMXO=0.0
C      SUMXN=0.0
C      SUMXO2=0.0
C      SUMXN2=0.0
C      N=0
C      IF(KROW.EQ.0) GO TO 205
C      DO 200 I=1,KROW
C      CALL GETROW(IUDESN,1,ROE,KCOL)
C      TNEW=ROE(JNEWT)
C      TMIN=ROE(JMINT)
C      TMINAB=ABS(TMIN)
C      IF(TNEW.EQ.TMINAB) GO TO 200
C      DVN=ROE(JDRV)
C      DVO=ROE(JDRVO)
C      LEFT=LINES-KOUNT
C      IF(LEFT.LT.2) KOUNT=LINES
C      CALL TITLES(2)
C      IF(KOUNT.GT.KOUNTH) GO TO 190
C      WRITE(IUPR,9002) (MES(KK,MESTYP),KK=1,6),(MES(KK,2),KK=1,6)
C      KOUNT=KOUNT+8
C  190 CONTINUE
C      WRITE(IUPR,9003) IROE,DVO,DVN
C      KOUNT=KOUNT+2
C      SUMXO=SUMXO+DVO
C      SUMXN=SUMXN+DVN
C      SUMXO2=SUMXO2+(DVO*DVO)
C      SUMXN2=SUMXN2+(DVN*DVN)
C      N=N+1
C  200 CONTINUE
C      CALL DCLOSE(IUDESN)
C
C  205 CONTINUE
C
C      IF(KLUBAL.EQ.0) GO TO 250
C      DO 220 I=1,NMBAL
C      IF(VMBNEW(I).EQ.0.) GO TO 220
C      DVN=DRVMB(I)
C      DVO=DRVMBO(I)
C      LEFT=LINES-KOUNT
C      IF(LEFT.LT.2) KOUNT=LINES
C      CALL TITLES(2)
C      IF(KOUNT.GT KOUNTH) GO TO 210
C      WRITE(IUPR,9002) (MES(KK,MESTYP),KK=1,6),(MES(KK,2),KK=1,6)
C  210 CONTINUE
C      WRITE(IUPR,9003) IDBAL(I),DVO,DVN
C      KOUNT=KOUNT+2
C      SUMXO=SUMXO+DVO
C      SUMXN=SUMXN+DVN
C      SUMXO2=SUMXO2+(DVO*DVO)
C      SUMXN2=SUMXN2+(DVN*DVN)
C      N=N+1
C  220 CONTINUE
C
C  250 C .TINUE
C
C      IF(N.NE.0) GO TO 260
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C     CALL DCLOSE(IUDESO)                                              DRVTV     287
C     CALL DCLOSE(IUDESN)                                              DRVTV     288
C 115 CONTINUE                                                         DRVTV     289
C     CALL DCLOSE(IUSTFN)                                              DRVTV     290
C                                                                      DRVTV     291
C                                                                      DRVTV     292
C NOW, CONSIDER MASS BALANCE VARIABLES-IF ANY.                         DRVTV     293
C                                                                      DRVTV     294
C     IF(KLUBAL.EQ.O) GO TO 180                                        DRVTV     295
C                                                                      DRVTV     296
C     DO 150 I=1,NMBAL                                                 DRVTV     297
C                                                                      DRVTV     298
C SET UP URED AND VRED.                                                DRVTV     299
C                                                                      DRVTV     300
C     DO 120 J=1,3                                                     DRVTV     301
C     L=MBDOF(I,J)                                                     DRVTV     302
C     VECTS(NR1,J)=CHART(NR1,L)                                        DRVTV     303
C     VECTS(NR2,J)=CHART(NR2,L)                                        DRVTV     304
C 120 CONTINUE                                                         DRVTV     305
C                                                                      DRVTV     306
C     SED=0.0                                                          DRVTV     307
C                                                                      DRVTV     308
C COMPUTE KINETIC ENERGY DENSITY AND FLUTTER VELOCITY DERIVATIVE.      DRVTV     309
C                                                                      DRVTV     310
C     B=CMPLX(0.,0.)                                                   DRVTV     311
C     DO 130 J=1,3                                                     DRVTV     312
C     B=B+VECTS(NR2,J)*VECTS(NR1,J)                                    DRVTV     313
C 130 CONTINUE                                                         DRVTV     314
C     AKED=REAL(B)-CSCL*AIMAG(B)                                       DRVTV     315
C     AKED=FK*AKED                                                     DRVTV     316
C                                                                      DRVTV     317
C     DRVMBO(I)=DRVMB(I)                                               DRVTV     318
C     DRVMB(I)=SED-AKED                                                DRVTV     319
C                                                                      DRVTV     320
C     LEFT=LINES-KOUNT                                                 DRVTV     321
C     IF(LEFT.LT.2) KOUNT=LINES                                        DRVTV     322
C     CALL TITLES(2)                                                   DRVTV     323
C     IF(KOUNT.GT.KOUNTH) GO TO 135                                    DRVTV     324
C     WRITE(IUPR,9000) (MES(KK,MESTYP),KK=1,6)                         DRVTV     325
C     KOUNT=KOUNT+5                                                    DRVTV     326
C 135 CONTINUE                                                         DRVTV     327
C     WRITE(IUPR,9001) IDBAL(I),DRVMB(I),SED,AKED                      DRVTV     328
C     KOUNT=KOUNT+2                                                    DRVTV     329
C                                                                      DRVTV     330
C 150 CONTINUE                                                         DRVTV     331
C                                                                      DRVTV     332
C                                                                      DRVTV     333
C 180 CONTINUE                                                         DRVTV     334
C                                                                      DRVTV     335
C     IF(NCYC.EQ.O) GO TO 9999                                         DRVTV     336
C                                                                      DRVTV     337
C LIST (IN A SEPARATE GROUP) DERIVATIVES FOR ALL ELEMENTS CATEGORIZED AS DRVTV   338
C FLUTTER CRITICAL IN LAST FLUTTER REDESIGN.                           DRVTV     339
C                                                                      DRVTV     340
C     MESTYP=1                                                         DRVTV     341
C     IF(NCYC.GT 1) MESTYP=2                                           DRVTV     342
C     CALL GEDLAB(8HDRVTV O3,IUDESN,NAME,IFDESN,KROW,KCOL)             DRVTV     343
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C     A=A/WT                                                            DRVTV   230
C                                                                       DRVTV   231
C     SED=REAL(A)-CSCL*AIMAG(A)                                         DRVTV   232
C     SED=FS*SED*386.4                                                  DRVTV   233
C                                                                       DRVTV   234
C     IF(MEMTYP.NE.2) GO TO 90                                          DRVTV   235
C                                                                       DRVTV   236
C BEAM TYPE ELEMENTS HAVE ROTATIONAL DEGREES OF FREEDOM. AS ROTARY      DRVTV   237
C INERTIAS ARE NOT BEING CONSIDERED (EXCEPT FOR FIXED MASS ITEMS), THESE DRVTV  238
C ROTATIONAL COMPONENTS MUST HAVE NO CONTRIBUTION TO THE KINETIC ENERGY DRVTV   239
C DENSITY.                                                              DRVTV   240
C                                                                       DRVTV   241
C     J=0                                                               DRVTV   242
C     DO 80 K=1,NODES                                                   DRVTV   243
C     JF=J+NGO(K)                                                       DRVTV   244
C     IF(NGO(K).LE.3) GO TO 70                                          DRVTV   245
C     JS=J+4                                                            DRVTV   246
C     DO 60 M=JS,JF                                                     DRVTV   247
C     VECTS(NR1,M)=CMPLX(0.0,0.0)                                       DRVTV   248
C     VECTS(NR2,M)=CMPLX(0.0,0.0)                                       DRVTV   249
C  60 CONTINUE                                                          DRVTV   250
C  70 J=JF                                                              DRVTV   251
C  80 CONTINUE                                                          DRVTV   252
C                                                                       DRVTV   253
C  90 CONTINUE                                                          DRVTV   254
C                                                                       DRVTV   255
C     B=CMPLX(0.,0.)                                                    DRVTV   256
C     DO 95 J=1,IROW                                                    DRVTV   257
C     B=B+VECTS(NR2,J)*VECTS(NR1,J)                                     DRVTV   258
C  95 CONTINUE                                                          DRVTV   259
C     B=B/NODES                                                         DRVTV   260
C                                                                       DRVTV   261
C     AKED=REAL(B)-CSCL*AIMAG(B)                                        DRVTV   262
C     AKED=FK*AKED                                                      DRVTV   263
C                                                                       DRVTV   264
C     DRV=SED-AKED                                                      DRVTV   265
C                                                                       DRVTV   266
C     IF(KLUSE.NE.2) GO TO 100                                          DRVTV   267
C     ROE(JDRVO)=ROE(JDRV)                                              DRVTV   268
C     ROE(JDRV)=DRV                                                     DRVTV   269
C     CALL PUTROW(IUDESN,2,ROE,KCOL)                                    DRVTV   270
C                                                                       DRVTV   271
C 100 CONTINUE                                                          DRVTV   272
C     LEFT=LINES-KOUNT                                                  DRVTV   273
C     IF(LEFT.LT.2) KOUNT=LINES                                         DRVTV   274
C     CALL TITLES(2)                                                    DRVTV   275
C     IF(KOUNT.GT.KOUNTH) GO TO 104                                     DRVTV   276
C     WRITE(IUPR,9000) (MES(KK,MESTYP),KK=1,6)                          DRVTV   277
C     KOUNT=KOUNT+5                                                     DRVTV   278
C 104 CONTINUE                                                          DRVTV   279
C     WRITE(IUPR,9001) MEM,DRV,SED,AKED                                 DRVTV   280
C     KOUNT=KOUNT+2                                                     DRVTV   281
C                                                                       DRVTV   282
C 110 CONTINUE                                                          DRVTV   283
C                                                                       DRVTV   284
C 112 CONTINUE                                                          DRVTV   285
C     IF(KLUSE.NE.2) GO TO 115                                          DRVTV   286
```

```
C
C     IUDESN=IUDUM2-IUDESN
C     IUDESO=IUDUM2-IUDESO
C     IFDESN=IFDUM2-IFDESN
C     IFDESO=IFDUM2-IFDESO
C
C     CALL GEDLAB(8HDRVTV 02,IUDESO,NAME,IFDESO,KROW,KCOL)
C     CALL PUDLAB(8HDRVTV 01,IUDESN,NAME,IFDESN,KROW,KCOL)
C   5 CONTINUE
C     CALL GEDLAB(8HDRVTV 03,IUSTFN,NAME,IFSTFN,JROW,JCOL)
C
C     KOUNT=LINES
C
C     IF(KLUSE.NE.2) KROW=JROW
C     IF(KROW.EQ.0) GO TO 112
C     DO 110 I=1,KROW
C     IF(KLUSE.NE.2) GO TO 10
C     CALL GETROW(IUDESO,1,ROE,KCOL)
C
C  10 CALL PREAD(IUSTFN,PATTY(1),24)
C     NBYTE=4*NODES
C     CALL PREAD(IUSTFN,NSTART(1),NBYTE)
C     CALL PREAD(IUSTFN,NGO(1),NBYTE)
C     NBYTE=NBYTES*IROW
C     DO 20 J=1,ICOL
C  20 CALL PREAD(IUSTFN,ELSTF(1,J),NBYTE)
C     CALL REND(IUSTFN)
C
C     IF(KLUSE.NE.2) GO TO 25
C     IF(MEM.NE.IROE) GO TO 10
C  25 CONTINUE
C
C SET UP VECTORS URED,VRED TO CONTAIN THOSE COMPONENTS OF THE FLUTTER
C VECTORS(PHYSICAL COORDINATES) ASSOCIATED WITH THE ELEMENT UNDER
C CONSIDERATION. THE JTH COMPONENTS OF URED AND VRED ARE STORED AS
C THE JTH COLUMN OF VARIABLE VECTS.
C
C     J=0
C     DO 40 K=1,NODES
C     NG=NGO(K)
C     IF(NG.EQ.0) GO TO 40
C     NS=NSTART(K)
C     NF=NS+NG-1
C     DO 30 L=NS,NF
C     J=J+1
C     DO 28 M=1,NROWS
C  28 VECTS(M,J)=CHART(M,L)
C  30 CONTINUE
C  40 CONTINUE
C
C COMPUTE STRAIN ENERGY DENSITY(SED), KINETIC ENERGY DENSITY(AKED), AND
C VELOCITY DERIVATIVE(DRV) FOR THE STRUCTURAL ELEMENT.
C
C     A=CMPLX(0.,0.)
C     DO 50 J=1,IROW
C     DO 50 K=1,ICOL
C  50 A=A+VECTS(2,J)*ELSTF(J,K)*VECTS(1,K)
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```
C      IF(KLUB.EQ.0) GO TO 9999                                  DRVTV   116
C 500  CONTINUE                                                  DRVTV   117
C      CALL GEDLAB(8HDRVTV 01,IUCOM,NAME,IFCOM,KROW,KCOL)        DRVTV   118
C      DO 550 I=1,KROW                                           DRVTV   119
C      CALL GETROW(IUCOM,1,ROE,KCOL)                             DRVTV   120
C      A=CMPLX(0.0,0.0)                                          DRVTV   121
C      B=CMPLX(0.0,0.0)                                          DRVTV   122
C      DO 520 J=1,KCOL                                           DRVTV   123
C      A=A+(ROE(J)*UMOD(J))                                      DRVTV   124
C      B=B+(ROE(J)*VMOD(J))                                      DRVTV   125
C 520  CONTINUE                                                  DRVTV   126
C      CHART(NU,I)=A                                             DRVTV   127
C      CHART(NV,I)=B                                             DRVTV   128
C 550  CONTINUE                                                  DRVTV   129
C      CALL DCLOSE(IUCOM)                                        DRVTV   130
C                                                                DRVTV   131
C      IF(KFREE.EQ.1.OR.NTYME.EQ.2) GO TO 600                    DRVTV   132
C                                                                DRVTV   133
C      NTYME=2                                                   DRVTV   134
C      NU=3                                                      DRVTV   135
C      NV=4                                                      DRVTV   136
C      IUCOM=IUQA                                                DRVTV   137
C      IFCOM=IFQA                                                DRVTV   138
C      IF(IRED.EQ.0) IUCOM=IUPHA                                 DRVTV   139
C      IF(IRED.EQ.0) IFCOM=IFPHA                                 DRVTV   140
C      GO TO 500                                                 DRVTV   141
C                                                                DRVTV   142
C 600  CONTINUE                                                  DRVTV   143
C                                                                DRVTV   144
C      IOUV=KLUFO(2)                                             DRVTV   145
C      IF(IOUV.NE.2) GO TO 700                                   DRVTV   146
C      KOUNT=LINES                                               DRVTV   147
C      DO 640 I=1,KROW                                           DRVTV   148
C      CALL TITLES(2)                                            DRVTV   149
C      IF(KOUNT.GT.KOUNTH) GO TO 620                             DRVTV   150
C      WRITE(IUPR,9006)                                          DRVTV   151
C      IF(KFREE.EQ.1) WRITE(IUPR,9007)                           DRVTV   152
C      IF(KFREE.EQ.2) WRITE(IUPR,9008)                           DRVTV   153
C      KOUNT=KOUNT+6                                             DRVTV   154
C 620  CONTINUE                                                  DRVTV   155
C      WRITE(IUPR,9009) I,(CHART(J,I),J=1,NROWS)                 DRVTV   156
C      KOUNT=KOUNT+1                                             DRVTV   157
C 640  CONTINUE                                                  DRVTV   158
C                                                                DRVTV   159
C                                                                DRVTV   160
C 700  CONTINUE                                                  DRVTV   161
C                                                                DRVTV   162
C                                                                DRVTV   163
C      NR1=1                                                     DRVTV   164
C      IF(KFREE.EQ.2) NR1=3                                      DRVTV   165
C      NR2=NR1+1                                                 DRVTV   166
C      FS=VF/(2.0*WW)                                            DRVTV   167
C      FK=VF/2.0                                                 DRVTV   168
C                                                                DRVTV   169
C FIRST, CONSIDER THE STRUCTURAL ELEMENTS.                       DRVTV   170
C                                                                DRVTV   171
C      IF(KLUSE.NE.2) GO TO 5                                    DRVTV   172
```

```
     1          MBDOF(20,3),DRVMB(20),DRVMBO(20),                        DRVTV  59
     2          S1MB(20),S2MB(20),S3MB(20)                               DRVTV  60
C                                                                        DRVTV  61
C ****************************************************                   DRVTV  62
C *       THE FOLLOWING LINE OF FASTOP CODE HAS          *               DRVTV  63
C *       BEEN COMMENTED OUT BECAUSE IT IS NOT           *               DRVTV  64
C *       USED IN THE CURRENT VERSION OF ESP.            *               DRVTV  65
C ****************************************************                   DRVTV  66
C     COMMON /ELMNT/ ELSTF(24,24),PATTY(6),NSTART(8),NGO(8)              DRVTV  67
C                                                                        DRVTV  68
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE       DRVTV  69
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        DRVTV  70
C                                                                        DRVTV  71
      DATA MES/4H(BAS,4HED O,4HN NO,4HRMAL,4H MOD,4HES) ,                DRVTV  72
     1         4H(BAS,4HED O,4HN CO,4HUPLE,4HD MO,4HDES)/                DRVTV  73
C                                                                        DRVTV  74
C                                                                        DRVTV  75
      CALL PROGNA(4H(DRV,4HTV ))                                         DRVTV  76
      CALL MESAGE(1,5,5HDRVTV)                                           DRVTV  77
      CALL TIMEB(10,10HFROM DRVTV)                                       DRVTV  78
C                                                                        DRVTV  79
      MESTYP=1                                                           DRVTV  80
      IF(NCYC.GT.0) MESTYP=2                                             DRVTV  81
C                                                                        DRVTV  82
C                                                                        DRVTV  83
C TRANSFORM MODAL FLUTTER VECTORS UMOD AND VMOD INTO STRUCTURAL          DRVTV  84
C COORDINATES TO FORM VECTORS UPHYS AND VPHYS.                           DRVTV  85
C    STEP1. (IF IRED=1) UPHYS= Q*UMOD AND VPHYS= Q*VMOD                  DRVTV  86
C           (IF IRED=0) UPHYS=PH*UMOD AND VPHYS=PH*VMOD                  DRVTV  87
C         THESE VECTORS ARE STORED IN ROWS 1 AND 2 OF VARIABLE CHART.    DRVTV  88
C         IF CANTILEVER MODES ARE BEING USED, THESE UPHYS AND VPHYS ARE  DRVTV  89
C         IN ABSOLUTE COORDINATES AND WILL BE USED TO COMPUTE BOTH       DRVTV  90
C         STRAIN ENERGY DENSITY (SED) AND KINETIC ENERGY DENSITY (KED).  DRVTV  91
C    STEP2. WHEN FREE-FREE MODES ARE USED, THE ABOVE UPHYS AND VPHYS     DRVTV  92
C         ARE IN RELATIVE (TO THE PLUG) COORDINATES AND WILL BE USED TO  DRVTV  93
C         COMPUTE SED ONLY. THEN, COMPUTE UPHYS AND VPHYS IN ABSOLUTE    DRVTV  94
C         COORDINATES AS FOLLOWS                                         DRVTV  95
C           (IF IRED=1) UPHYS= QA*UMOD AND VPHYS= QA*VMOD                DRVTV  96
C           (IF IRED=0) UPHYS=PHA*UMOD AND VPHYS=PHA*VMOD                DRVTV  97
C         THESE VECTORS ARE STORED IN ROWS 3 AND 4 OF VARIABLE CHART.    DRVTV  98
C         AND WILL BE USED TO COMPUTE KED.                               DRVTV  99
C                                                                        DRVTV 100
C                                                                        DRVTV 101
      NTYME=1                                                            DRVTV 102
      NU=1                                                               DRVTV 103
      NV=2                                                               DRVTV 104
      IUCOM=IUQ                                                          DRVTV 105
      IFCOM=IFQ                                                          DRVTV 106
      IF(IRED.EQ.0) IUCOM=IUPH                                           DRVTV 107
      IF(IRED.EQ.0) IFCOM=IFPH                                           DRVTV 108
C                                                                        DRVTV 109
C ****************************************************                   DRVTV 110
C *       THE FOLLOWING LINES OF FASTOP CODE HAVE        *               DRVTV 111
C *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT        *               DRVTV 112
C *       USED IN THE CURRENT VERSION OF ESP.            *               DRVTV 113
C ****************************************************                   DRVTV 114
C                                                                        DRVTV 115
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      SUBROUTINE DRVTV(CHART,VECTS,NROWS)                               DRVTV      2
C                                                                       DRVTV      3
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     DRVTV      4
C     DOUBLE PRECISION ELSTF                                            DRVTV      5
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        DRVTV      6
C                                                                       DRVTV      7
      COMPLEX UMOD,VMOD,CHART,VECTS,A,B                                 DRVTV      8
C                                                                       DRVTV      9
      DIMENSION CHART(NROWS,1),VECTS(NROWS,1)                           DRVTV     10
      DIMENSION ROE(25),NAME(2)                                         DRVTV     11
      DIMENSION IPOS(20)                                                DRVTV     12
      DIMENSION MES(6,2)                                                DRVTV     13
C                                                                       DRVTV     14
      EQUIVALENCE (ROE(1),IROE)                                         DRVTV     15
C                                                                       DRVTV     16
C   *****************************************************              DRVTV     17
C   *       THE FOLLOWING LINE OF FASTOP CODE HAS       *              DRVTV     18
C   *       BEEN COMMENTED OUT BECAUSE IT IS NOT        *              DRVTV     19
C   *       USED IN THE CURRENT VERSION OF ESP.         *              DRVTV     20
C   *****************************************************              DRVTV     21
C     EQUIVALENCE (PATTY(1),MEM),(PATTY(2),NODES),(PATTY(3),IROW),      DRVTV     22
C    *            (PATTY(4),ICOL),(PATTY(5),WT),(PATTY(6),MEMTYP)       DRVTV     23
C                                                                       DRVTV     24
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, DRVTV     25
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,         DRVTV     26
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       DRVTV     27
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   DRVTV     28
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         DRVTV     29
     5               IUDESI,IFDESI,IUWTI,IFWTI,                         DRVTV     30
     6               IUMEMO,IFMEMO,IUBT,IFBT,                           DRVTV     31
     7               IUDESN,IFDESN,IUMD,IFMD,                           DRVTV     32
     8               IUMEMF,IFMEMF,                                     DRVTV     33
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, DRVTV     34
     A               IUDESF,IFDESF,IUWT,IFWT,                           DRVTV     35
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,         DRVTV     36
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,     DRVTV     37
     D               IUBR,IFBR,                                         DRVTV     38
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                       DRVTV     39
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,       DRVTV     40
     G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK              DRVTV     41
      COMMON /CLUFO/ LKLUFO,KLUFO(20)                                   DRVTV     42
      COMMON /KLUFF/ KFREE                                              DRVTV     43
      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI         DRVTV     44
     1               ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF         DRVTV     45
     2               ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT               DRVTV     46
     3               ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT   DRVTV     47
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPASS,IDNOPT,  DRVTV     48
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND,DRVTV     49
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                          DRVTV     50
      COMMON/COLS/ IT,IMINT,IMAXT,IDENS,IOLDT,IOLDW,ISRAT,IMINTO,       DRVTV     51
     A             IINITT,IWPUT,                                        DRVTV     52
     1             NVAR,JWPUT,JINITT,JMINT,JMAXT,JOLDT,JNEWT,JDRV,      DRVTV     53
     2             JDRVO,JSPR1,JSPR2,JSPR3                              DRVTV     54
      COMMON /FILE  / IPOS                                              DRVTV     55
      COMMON /CBYTES/ NBYTES                                            DRVTV     56
      COMMON /FLUT/ UMOD(40),VMOD(40),VF,WW,CSCL,NMODE,IDMODE(40)       DRVTV     57
      COMMON/BAL/ NMBAL,IDBAL(20),VMBIN(20),VMBOLD(20),VMBNEW(20),      DRVTV     58
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STATEMENT LABELS                DEF LINE   REFERENCES
  577   145      FMT              227          74
  620   150      FMT              246          75
  646   155      FMT              265          76
  705   160      FMT              284          77
  745   165      FMT              303          78
 1005   170      FMT              322          79
 1051   175      FMT              342          80

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       COMRWP         3              0 ITAPER (1)          1 ITAPEW (1)          2 ITAPEP (1)
       CLIST         11              0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                                     3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                                     6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                     9 KOUNTH (1)         10 KOUNTI (1)
       CTABLE         8              0 KTABLE (1)          1 NPASS  (1)          2 NROWS  (1)
                                     3 NCOLS  (1)          4 NCOLST (1)          5 KTABLO (1)
                                     6 NPAGEA (1)          7 ITAPET (1)
       CAFFDL         4              0 AFFDL  (4)

STATISTICS
  PROGRAM LENGTH                  1132B      602
  CM LABELED COMMON LENGTH          32B       26
          52000B CM USED
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            C                                                                     TAFOM     344
                  RETURN                                                          TAFOM     345
  345             END                                                             TAFOM     346




        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  TAFOM          15          344

VARIABLES      SN  TYPE            RELOCATION
    0  AFFDL      REAL       ARRAY  CAFFDL      REFS       17      24      69
    2  ITAPEP     INTEGER           COMRWP      REFS       19
    0  ITAPER     INTEGER           COMRWP      REFS       19
    7  ITAPET     INTEGER           CTABLE      REFS       22
    1  ITAPEW     INTEGER           COMRWP      REFS       19   I/O REFS   65      66      67      68      69
                                                  70       71      72      73      74      75      76      77
                                                  78       79      80
    0  KALGOR     INTEGER            F.P.       REFS       58   DEFINED    15
    7  KBPAGE     INTEGER           CLIST       REFS       20
    4  KLABEL     INTEGER           CLIST       REFS       20
    0  KOUNT      INTEGER           CLIST       REFS       20   DEFINED    29      49      60
   11  KOUNTH     INTEGER           CLIST       REFS       20
   12  KOUNTI     INTEGER           CLIST       REFS       20
    1  KPAGE      INTEGER           CLIST       REFS       20
    0  KTABLE     INTEGER           CTABLE      REFS       22   DEFINED    33      37      40      43      46
                                                  56
    5  KTABLO     INTEGER           CTABLE      REFS       22
    5  KTPAGE     INTEGER           CLIST       REFS       20
    2  LINES      INTEGER           CLIST       REFS       20      29      49      60
   10  LINESG     INTEGER           CLIST       REFS       20
    3  LINEST     INTEGER           CLIST       REFS       20
    3  NCOLS      INTEGER           CTABLE      REFS       22   DEFINED    31      55
    4  NCOLST     INTEGER           CTABLE      REFS       22
    6  NPAGE      INTEGER           CLIST       REFS       20
    6  NPAGEA     INTEGER           CTABLE      REFS       22   DEFINED    57
    1  NPASS      INTEGER           CTABLE      REFS       22
    2  NROWS      INTEGER           CTABLE      REFS       22   DEFINED    32      36      54
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       PTABLE                 3             34      38       41      44      47      58
       TITLES                 1             30

STATEMENT LABELS              DEF LINE    REFERENCES
  220   100       FMT            81          65
  270   105       FMT            99          66
  336   110       FMT           115          67
  373   115       FMT           131          68
  430   120       FMT           147          69
  464   125       FMT           163          70
  514   130       FMT           179          71
  535   135       FMT           195          72
  556   140       FMT           211          73
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VARIABLES       SN  TYPE            RELOCATION
   265  S1MB        REAL       ARRAY    BAL          REFS          57
   311  S2MB        REAL       ARRAY    BAL          REFS          57
   335  S3MB        REAL       ARRAY    BAL          REFS          57
     0  UMOD        COMPLEX    ARRAY    FLUT         REFS           7        56
    10  VDES        REAL                KLUES        REFS          47
     0  VECTS       COMPLEX    ARRAY     F.P.        REFS           7         9        426    DEFINED        1
   240  VF          REAL                FLUT         REFS          56
    25  VMBIN       REAL       ARRAY    BAL          REFS          57
    75  VMBNEW      REAL       ARRAY    BAL          REFS          57
    51  VMBOLD      REAL       ARRAY    BAL          REFS          57
   120  VMOD        COMPLEX    ARRAY    FLUT         REFS           7        56
   241  WW          REAL                FLUT         REFS          56

EXTERNALS             TYPE     ARGS         REFERENCES
        DRVSTR                   3             426
        MESAGE                   3              76          430
        PROGNA                   2              75          427
        TIMEB                    2              77          429

STATEMENT LABELS                  DEF LINE   REFERENCES
    77  9000     FMT  NO REFS       432
   122  9001     FMT  NO REFS       437
   126  9002     FMT  NO REFS       438
   152  9003     FMT  NO REFS       443
   155  9004     FMT  NO REFS       444
   163  9005     FMT  NO REFS       445
   226  9006     FMT  NO REFS       453
   235  9007     FMT  NO REFS       454
   247  9008     FMT  NO REFS       458
   273  9009     FMT  NO REFS       463

COMMON BLOCKS     LENGTH      MEMBERS - BIAS NAME(LENGTH)
        PLACES        98                 0 IUIN1  (1)              1 IUIN2  (1)              2 IUOUT1 (1)
                                         3 IUOUT2 (1)              4 IUGO1  (1)              5 IUGO2  (1)
                                         6 IUGO3  (1)              7 IUGO4  (1)              8 IUSCR  (1)
                                         9 IFSCR  (1)             10 IFS1   (1)             11 IFS2   (1)
                                        12 IFS3   (1)             13 IFS4   (1)             14 IUCD   (1)
                                        15 IUPR   (1)             16 IUA    (1)             17 IFA    (1)
                                        18 IUY    (1)             19 IFY    (1)             20 IUMEMN (1)
                                        21 IFMEMN (1)             22 IUSTFN (1)             23 IFSTFN (1)
                                        24 IUKS   (1)             25 IFKS   (1)             26 IUB    (1)
                                        27 IFB    (1)             28 IUDESO (1)             29 IFDESO (1)
                                        30 IUMDBI (1)             31 IFMDBI (1)             32 IUADDI (1)
                                        33 IFADDI (1)             34 IUBALI (1)             35 IFBALI (1)
                                        36 IUDESI (1)             37 IFDESI (1)             38 IUWTI  (1)
                                        39 IFWTI  (1)             40 IUMEMO (1)             41 IFMEMO (1)
                                        42 IUBT   (1)             43 IFBT   (1)             44 IUDESN (1)
                                        45 IFDESN (1)             46 IUMD   (1)             47 IFMD   (1)
                                        48 IUMEMF (1)             49 IFMEMF (1)             50 IUSTFO (1)
                                        51 IFSTFO (1)             52 IUMDB  (1)             53 IFMDB  (1)
                                        54 IUADD  (1)             55 IFADD  (1)             56 IUBAL  (1)
                                        57 IFBAL  (1)             58 IUDESF (1)             59 IFDESF (1)
                                        60 IUWT   (1)             61 IFWT   (1)             62 IUDUM1 (1)
                                        63 IFDUM1 (1)             64 IUDUM2 (1)             65 IFDUM2 (1)
                                        66 IUDUM3 (1)             67 IFDUM3 (1)             68 IUL    (1)
                                        69 IFL    (1)             70 IUYT   (1)             71 IFYT   (1)
                                        72 IUZ    (1)             73 IFZ    (1)             74 IUZR   (1)
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COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                   75 IFZR    (1)           76 IULR    (1)           77 IFLR    (1)
                                   78 IUBR    (1)           79 IFBR    (1)           80 IUPHTF  (1)
                                   81 IFPHTF  (1)           82 IUMODM  (1)           83 IFMODM  (1)
                                   84 IUMODK  (1)           85 IFMODK  (1)           86 IUPHT   (1)
                                   87 IFPHT   (1)           88 IUQT    (1)           89 IFQT    (1)
                                   90 IUQ     (1)           91 IFQ     (1)           92 IUPH    (1)
                                   93 IFPH    (1)           94 IUINCM  (1)           95 IFINCM  (1)
                                   96 IUINCK  (1)           97 IFINCK  (1)
      CLUFO          21             0 LKLUFO  (1)            1 KLUFO   (20)
      KLUFF           1             0 KFREE   (1)
      PLAYFF         26             0 IUMDFF  (1)            1 IFMDFF  (1)            2 IUDLTI  (1)
                                    3 IFDLTI  (1)            4 IUSLTI  (1)            5 IFSLTI  (1)
                                    6 IUMPLI  (1)            7 IFMPLI  (1)            8 IUTPGT  (1)
                                    9 IFTPGT  (1)           10 IUPATF  (1)           11 IFPATF  (1)
                                   12 IUMPL   (1)           13 IFMPL   (1)           14 IUSLT   (1)
                                   15 IFSLT   (1)           16 IUDLT   (1)           17 IFDLT   (1)
                                   18 IUQA    (1)           19 IFQA    (1)           20 IUQAT   (1)
                                   21 IFQAT   (1)           22 IUPHA   (1)           23 IFPHA   (1)
                                   24 IUPHAT  (1)           25 IFPHAT  (1)
      KLUES          24             0 KLUSE   (1)            1 KLUNAL  (1)            2 IRED    (1)
                                    3 KLUMD   (1)            4 KLUBAL  (1)            5 MSADD   (1)
                                    6 NPASS   (1)            7 IDNOPT  (1)            8 VDES    (1)
                                    9 EPS1    (1)           10 DWMAX   (1)           11 NBAR    (1)
                                   12 NFIX    (1)           13 D       (1)           14 DEL     (1)
                                   15 EPS2    (1)           16 NCYC    (1)           17 NNN     (1)
                                   18 IBAND   (1)           19 IFIN    (1)           20 KLUB    (1)
                                   21 KLUQ    (1)           22 MORBAL  (1)           23 DBAL    (1)
      COLS           22             0 IT      (1)            1 IMINT   (1)            2 IMAXT   (1)
                                    3 IDENS   (1)            4 IOLDT   (1)            5 IOLDW   (1)
                                    6 ISRAT   (1)            7 IMINTO  (1)            8 IINITT  (1)
                                    9 IWPUT   (1)           10 NVAR    (1)           11 JWPUT   (1)
                                   12 JINITT  (1)           13 JMINT   (1)           14 JMAXT   (1)
                                   15 JOLDT   (1)           16 JNEWT   (1)           17 JDRV    (1)
                                   18 JDRVO   (1)           19 JSPR1   (1)           20 JSPR2   (1)
                                   21 JSPR3   (1)
      FILE           20             0 IPOS    (20)
      CBYTES          1             0 NBYTES  (1)
      FLUT          204             0 UMOD    (80)          80 VMOD    (80)          160 VF      (1)
                                  161 WW      (1)          162 CSCL    (1)          163 NMODE   (1)
                                  164 IDMODE  (40)
      BAL           241             0 NMBAL   (1)            1 IDBAL   (20)          21 VMBIN   (20)
                                   41 VMBOLD  (20)          61 VMBNEW  (20)          81 MBDOF   (60)
                                  141 DRVMB   (20)         161 DRVMBO  (20)         181 S1MB    (20)
                                  201 S2MB    (20)         221 S3MB    (20)
      CLIST          11             0 KOUNT   (1)            1 KPAGE   (1)            2 LINES   (1)
                                    3 LINEST  (1)            4 KLABEL  (1)            5 KTPAGE  (1)
                                    6 NPAGE   (1)            7 KBPAGE  (1)            8 LINESG  (1)
                                    9 KOUNTH  (1)           10 KOUNTI  (1)

EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      ROE            25             0 IROE    (1)

STATISTICS
  PROGRAM LENGTH                 404B      260
  CM LABELED COMMON LENGTH      1235B      669
          52000B CM USED
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      SUBROUTINE DRVSTR(CHART,VECTS,NROWS)                              DRVSTR     2
C                                                                       DRVSTR     3
C                                                                       DRVSTR     4
      COMPLEX CHART,VECTS,B,UMOD,VMOD                                   DRVSTR     5
      COMPLEX A                                                         DRVSTR     6
C                                                                       DRVSTR     7
C                                                                       DRVSTR     8
      DIMENSION DMS(3,6,6),VAR(7)                                       DRVSTR     9
      COMMON /KLUFF/ KFREE                                              DRVSTR    10
      DIMENSION CHART(NROWS,1),VECTS(NROWS,1)                           DRVSTR    11
      DIMENSION DMM(6,6),IDDOF(5,6),NDOF(5)                             DRVSTR    12
      DIMENSION ROE(40),NAME(2)                                         DRVSTR    13
C                                                                       DRVSTR    14
C                                                                       DRVSTR    15
      COMMON /CLIST/ KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE       DRVSTR    16
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                        DRVSTR    17
      COMMON /STORES/ NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    DRVSTR    18
     A                ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3) DRVSTR    19
     B                ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)      DRVSTR    20
     C                ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)      DRVSTR    21
     D     ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                         DRVSTR    22
     E     ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                            DRVSTR    23
     F     ,STRFDO(5,6),STRFDN(5,6)                                     DRVSTR    24
      COMMON/ INVERT / INVERT,IUA2,IFLEX,AORD(30),IPERM(30),NSTOR(30,2) DRVSTR    25
     A,IPREV,NDOFT                                                      DRVSTR    26
      DIMENSION NAME1(2),BUF1(1000),BUF2(1000)                          DRVSTR    27
      DIMENSION BUF3(1000), DELTA(30)                                   DRVSTR    28
      COMPLEX C                                                         DRVSTR    29
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD      DRVSTR    30
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              DRVSTR    31
      COMMON/CTAPES/ ITAPES(50)                                         DRVSTR    32
      COMMON /FLUT/ UMOD(40),VMOD(40),VF,WW,CSCL,NMODE,IDMODE(40)       DRVSTR    33
      COMMON/LOCSTR/ IUSTRI,IFSTRI,IUMREF,IFMREF                        DRVSTR    34
     1              ,IUMOD,IFMOD                                        DRVSTR    35
C                                                                       DRVSTR    36
C                                                                       DRVSTR    37
      DIMENSION VAR2(6)                                                 DRVSTR    38
      DATA VAR2 /4HPFX ,4HPFY ,4HPFZ ,4HPFXX,4HPFYY,4HPFZZ/             DRVSTR    39
      DATA VAR /4HW   ,4HIXX ,4HIYY ,4HIZZ ,4HSX  ,4HSY  ,4HSZ  /       DRVSTR    40
C                                                                       DRVSTR    41
      CALL PROGNA(4H(DRV,4HSTR))                                        DRVSTR    42
      CALL MESAGE(1,6,6HDRVSTR)                                         DRVSTR    43
C                                                                       DRVSTR    44
      NTYME=1                                                           DRVSTR    45
      NU=1                                                              DRVSTR    46
      NV=2                                                              DRVSTR    47
      IFMOD=2                                                           DRVSTR    48
    4 CONTINUE                                                          DRVSTR    49
      CALL GEDLAB(8HDRVSTRO1,IUMOD,NAME,IFMOD,KROW,KCOL)                DRVSTR    50
      ITAPEN = ITAPES(40)                                               DRVSTR    51
      DO 5 I = 1,KROW                                                   DRVSTR    52
      CALL GETROW(IUMOD,1,ROE,KCOL)                                     DRVSTR    53
      A = CMPLX(0.,0.)                                                  DRVSTR    54
      B = CMPLX(0.,0.)                                                  DRVSTR    55
      DO 3 J=1,KCOL                                                     DRVSTR    56
      A = A + (ROE(J)*UMOD(J))                                          DRVSTR    57
      B = B + (ROE(J)*VMOD(J))                                          DRVSTR    58
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      3 CONTINUE                                                        DRVSTR     59
        CHART(NU,I)= A                                                  DRVSTR     60
        CHART(NV,I)= B                                                  DRVSTR     61
      5 CONTINUE                                                        DRVSTR     62
        CALL DCLOSE(IUMOD)                                              DRVSTR     63
C                                                                       DRVSTR     64
        IF(KFREE.EQ.1 .OR. NTYME.EQ.2) GO TO 6                          DRVSTR     65
        NU= 3                                                           DRVSTR     66
        NV= 4                                                           DRVSTR     67
        IFMOD=3                                                         DRVSTR     68
        NTYME=2                                                         DRVSTR     69
        GO TO 4                                                         DRVSTR     70
      6 CONTINUE                                                        DRVSTR     71
C                                                                       DRVSTR     72
        FK=VF/2.0                                                       DRVSTR     73
C                                                                       DRVSTR     74
C       SAVE OLD DERIVATIVES                                            DRVSTR     75
C                                                                       DRVSTR     76
        DO 95 I = 1, 5                                                  DRVSTR     77
        DO 95 J = 1, 6                                                  DRVSTR     78
     95 STRFDO(I,J) = STRFDN(I,J)                                       DRVSTR     79
C                                                                       DRVSTR     80
C       SET UP I/O UNITS.                                               DRVSTR     81
C                                                                       DRVSTR     82
        N1 = ITAPES(21)                                                 DRVSTR     83
        N2 = ITAPES(22)                                                 DRVSTR     84
        N3 = ITAPES(23)                                                 DRVSTR     85
        N4 = ITAPES(28)                                                 DRVSTR     86
        N5 = ITAPES(29)                                                 DRVSTR     87
        N6 = ITAPES(30)                                                 DRVSTR     88
        N7 = ITAPES(32)                                                 DRVSTR     89
        N8 = ITAPES(33)                                                 DRVSTR     90
        N9 = ITAPES(36)                                                 DRVSTR     91
        N10 = ITAPES(50)                                                DRVSTR     92
CIBM                                                                    DRVSTR     93
C       IUSTF = 8                                                       DRVSTR     94
CIBM                                                                    DRVSTR     95
CCDC                                                                    DRVSTR     96
        IUSTF = 5                                                       DRVSTR     97
CCDC                                                                    DRVSTR     98
C                                                                       DRVSTR     99
C       CALCULATE INCREMENTAL CHANGE IN PYLON FLEXIBILITIES FOR THIS STEP DRVSTR    100
C                                                                       DRVSTR    101
        CALL TIMEB(13,13HBEFORE CHANGE )                                DRVSTR    102
        CALL CHANGE( DELTA )                                            DRVSTR    103
        CALL TIMEB(12,12HAFTER CHANGE )                                 DRVSTR    104
C                                                                       DRVSTR    105
C       READ PYLON-PYLON PARTITION OF STIFFNESS MATRIX                  DRVSTR    106
C       AND FORM MATRIX ( I - DELTA * KPP ) ON UNIT N1.                 DRVSTR    107
C                                                                       DRVSTR    108
        REWIND N1                                                       DRVSTR    109
        CALL GEDLAB (8HDRVSTR01,IUSTF,NAME1,4,KROW,KCOL)                DRVSTR    110
        DO 103 I = 1, KROW                                              DRVSTR    111
        CALL GETROW (IUSTF,1,BUF1,KCOL)                                 DRVSTR    112
        DO 102 J = 1, KCOL                                              DRVSTR    113
        IF( J .NE. I ) GO TO 101                                        DRVSTR    114
        BUF2(J) = 1.0 + DELTA(I) * BUF1(J)                              DRVSTR    115
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          GO TO 102                                                     DRVSTR     116
      101 BUF2(J) = DELTA(I) * BUF1(J)                                  DRVSTR     117
      102 CONTINUE                                                      DRVSTR     118
          WRITE(N1) ( BUF2(K), K = 1, KCOL )                            DRVSTR     119
      103 CONTINUE                                                      DRVSTR     120
          REWIND N1                                                     DRVSTR     121
C                                                                       DRVSTR     122
C          FORM R = INV( I - DELTA * KPP ) IN COLUMN SORT ON N3.        DRVSTR     123
C                                                                       DRVSTR     124
          CALL TIMEB(10,10HBEFORE INV )                                 DRVSTR     125
          CALL INV(KROW,N1,N2,N3,N4,N5,N6,N7,N8,1000,BUF1,BUF2,0)       DRVSTR     126
          CALL TIMEB(9,9HAFTER INV )                                    DRVSTR     127
                                                                        DRVSTR     128
C                                                                       DRVSTR     129
C         PUT KP ON N2 IN ROW SORT                                      DRVSTR     130
C                                                                       DRVSTR     131
          CALL GEDLAB (8HDRVSTRO2,IUSTF,NAME1,3,JROW,JCOL)              DRVSTR     132
          REWIND N2                                                     DRVSTR     133
          DO 105 I = 1, JROW                                            DRVSTR     134
          CALL GETROW (IUSTF,1,BUF1,JCOL)                               DRVSTR     135
          WRITE(N2) ( BUF1(K), K = 1, JCOL )                            DRVSTR     136
      105 CONTINUE                                                      DRVSTR     137
C                                                                       DRVSTR     138
C         TRANSPOSE MATRIX ON N2 TO PRODUCE COLUMNS OF ORIGINAL         DRVSTR     139
C         STIFFNESS MATRIX CORRESPONDING TO PYLON D.O.F.                DRVSTR     140
C                                                                       DRVSTR     141
          REWIND N2                                                     DRVSTR     142
          CALL TIMEB(13,13HBEFORE TRPOSE )                              DRVSTR     143
          CALL TRPOSE(N2,BUF1,BUF2,JCOL,JROW,N4,N5,1000)                DRVSTR     144
          CALL TIMEB(12,12HAFTER TRPOSE )                               DRVSTR     145
C                                                                       DRVSTR     146
C         FORM  KP * R                                                  DRVSTR     147
C                                                                       DRVSTR     148
          REWIND N3                                                     DRVSTR     149
          REWIND N1                                                     DRVSTR     150
          REWIND N4                                                     DRVSTR     151
          CALL TRIXY(N4,N3,N1,JROW,JCOL,KCOL,BUF1,BUF2,BUF3,1000,IRET)  DRVSTR     152
          CALL TIMEB(11,11HAFTER TRIXY )                                DRVSTR     153
C                                                                       DRVSTR     154
C         CALCULATE NDOFT PYLON FLEXIBILITY DERIVATIVES.                DRVSTR     155
C                                                                       DRVSTR     156
          ND = JROW                                                     DRVSTR     157
          REWIND N1                                                     DRVSTR     158
          DO 140 I = 1, NDOFT                                           DRVSTR     159
          READ(N1) ( BUF1(K), K = 1, ND )                               DRVSTR     160
          A = CMPLX(O.,O.)                                              DRVSTR     161
          B = CMPLX(O.,O.)                                              DRVSTR     162
          DO 120 K = 1, ND                                              DRVSTR     163
          C =  BUF1(K) * CHART(1,K)                                     DRVSTR     164
          B = B + C                                                     DRVSTR     165
      120 CONTINUE                                                      DRVSTR     166
          DO 130 J = 1, ND                                              DRVSTR     167
          C =  CHART(2,J) * BUF1(J)                                     DRVSTR     168
          A = A + C                                                     DRVSTR     169
      130 CONTINUE                                                      DRVSTR     170
          B = A * B                                                     DRVSTR     171
          AKED = REAL(B) - CSCL * AIMAG(B)                              DRVSTR     172
```

```
      AKED = - AKED                                                     DRVSTR   173
      JROW = NSTOR(I,1)                                                 DRVSTR   174
      JCOL = NSTOR(I,2)                                                 DRVSTR   175
      STRFDN(JROW,JCOL) = ( FK/WW) * AKED * 386.4                       DRVSTR   176
  140 CONTINUE                                                          DRVSTR   177
      CALL TIMEB(16,16HAFTER FLEX DERIV )                               DRVSTR   178
C                                                                       DRVSTR   179
      DO 200 I=1,NUMSTR                                                 DRVSTR   180
C                                                                       DRVSTR   181
C SET UP DERIVATIVE OF MASS MATRIX WITH RESPECT TO WEIGHT.              DRVSTR   182
C                                                                       DRVSTR   183
      DO 10 J=1,6                                                       DRVSTR   184
      DO 10 K=1,6                                                       DRVSTR   185
      DMM(J,K)=0.0                                                      DRVSTR   186
   10 CONTINUE                                                          DRVSTR   187
C                                                                       DRVSTR   188
      SX= STRRN(I,1)                                                    DRVSTR   189
      SY= STRRN(I,2)                                                    DRVSTR   190
      SZ= STRRN(I,3)                                                    DRVSTR   191
C                                                                       DRVSTR   192
C                                                                       DRVSTR   193
      DO 20 J=1,3                                                       DRVSTR   194
      DMM(J,J)=1.0                                                      DRVSTR   195
   20 CONTINUE                                                          DRVSTR   196
C                                                                       DRVSTR   197
      DMM(4,2)= -SZ                                                     DRVSTR   198
C     CURRENT EQUATIONS FOR DERIVATIVES OF STORE MASS MATRIX ARE BASED  DRVSTR   199
C     ON RIGHT-HAND COORDINATE SYSTEM.                                  DRVSTR   200
C                                                                       DRVSTR   201
C     ORIGINAL EQUATIONS, TAKEN FROM GAC REPORT ADCR-80-1, ARE          DRVSTR   202
C     RETAINED AS COMMENTS.                                             DRVSTR   203
C                                                                       DRVSTR   204
      DMM(4,3)= SY                                                      DRVSTR   205
      DMM(4,4)= (SY*SY)+(SZ*SZ)                                         DRVSTR   206
C                                                                       DRVSTR   207
      DMM(5,1)= SZ                                                      DRVSTR   208
      DMM(5,3)= -SX                                                     DRVSTR   209
      DMM(5,4)= -SX*SY                                                  DRVSTR   210
      DMM(5,5)= (SX*SX)+(SZ*SZ)                                         DRVSTR   211
C                                                                       DRVSTR   212
C     DMM(6,1)= SY                                                      DRVSTR   213
C     DMM(6,2)=-SX                                                      DRVSTR   214
C     DMM(6,4)= SX*SZ                                                   DRVSTR   215
C     DMM(6,5)= SY*SZ                                                   DRVSTR   216
      DMM(6,1)=-SY                                                      DRVSTR   217
      DMM(6,2)= SX                                                      DRVSTR   218
      DMM(6,4)=-SX*SZ                                                   DRVSTR   219
      DMM(6,5)=-SY*SZ                                                   DRVSTR   220
      DMM(6,6)= (SX*SX)+(SY*SY)                                         DRVSTR   221
C                                                                       DRVSTR   222
      DO 30 J=1,6                                                       DRVSTR   223
      DO 30 K=1,J                                                       DRVSTR   224
      DMM(K,J)=DMM(J,K)                                                 DRVSTR   225
   30 CONTINUE                                                          DRVSTR   226
C                                                                       DRVSTR   227
C CONTRACT DMM TO ACCOUNT FOR ANY IGNORED STRUCTURAL DOF.               DRVSTR   228
C                                                                       DRVSTR   229
```

```
      K=0
      DO 40 J=1,6
      IF(IDYDOF(I,J).EQ.0) GO TO 40
      K=K+1
      IDDOF(I,K)=IDYDOF(I,J)
      DO 35 L=1,6
      DMM(K,L)=DMM(J,L)
   35 CONTINUE
   40 CONTINUE
C
      K=0
      DO 45  L=1,6
      IF (IDYDOF(I,L).EQ.0) GOTO 45
      K=K+1
      IDDOF (I,K) = IDYDOF(I,L)
      DO 44  J=1,6
      DMM(J,K)  = DMM(J,L)
   44 CONTINUE
   45 CONTINUE
C
      NDOF(I)=K
C
C SET UP VECTORS (VECTS) TO CONTAIN COMPONENTS OF FLUTIER VECTORS
C ASSOCIATED WITH STORE UNDER CONSIDERATIUN.
C
      L=NDOF(I)
      K=0
      DO 50 J=1,L
      M=IDDOF(I,J)
      VECTS(1,J)= CHART(3,M)
      VECTS(2,J)= CHART(4,M)
   50 CONTINUE
C
C NOW FORM DERIVATIVE (OF WEIGHT VARIABLE)
C
      B=CMPLX(0.,0.)
      DO 60 J=1,L
      DO 60 K=1,L
      B=B+VECTS(2,J)*DMM(J,K)*VECTS(1,K)
   60 CONTINUE
C
      AKED=REAL(B)-CSCL*AIMAG(B)
      AKED=FK*AKED
C
      STRWDO(I)=STRWDN(I)
      STRWDN(I)=-AKED
C
C NOW CONSIDER INERTIA TYPE VARIABLES.
C
      DO 70 J=4,6
      B=CMPLX(0.,0.)
      IF(IDYDOF(I,J).EQ.0) GO TO 70
      L=IDYDOF(I,J)
      B= B + CHART(4,L)*CHART(3,L)
      AKED=REAL(B)-CSCL*AIMAG(B)
      AKED=FK*AKED
      K=J-3
```

```
          STRIDO(I,K)=STRIDN(I,K)                                      DRVSTR     287
          STRIDN(I,K)=-AKED                                            DRVSTR     288
       70 CONTINUE                                                     DRVSTR     289
          IF(KCONST.NE.O) GO TO 73                                     DRVSTR     290
          X = STRIDN(I,2) + STRIDN(I,3)                                DRVSTR     291
          STRIDN(I,2) = X                                              DRVSTR     292
          STRIDN(I,3) = X                                              DRVSTR     293
       73 CONTINUE                                                     DRVSTR     294
      C                                                                DRVSTR     295
      C NOW CONSIDER CG TYPE VARIABLES                                 DRVSTR     296
      C                                                                DRVSTR     297
          DO 75 J= 1,3                                                 DRVSTR     298
          DO 75 K= 1,6                                                 DRVSTR     299
          DO 75 L= 1,6                                                 DRVSTR     300
          DMS(J,K,L)= 0.0                                              DRVSTR     301
       75 CONTINUE                                                     DRVSTR     302
      C                                                                DRVSTR     303
          W= STRWN(I)                                                  DRVSTR     304
          DMS(1,5,3)= -W                                               DRVSTR     305
          DMS(1,5,4)= -W*SY                                            DRVSTR     306
          DMS(1,5,5)=  W*SX*2.                                         DRVSTR     307
      C   DMS(1,6,2)= -W                                               DRVSTR     308
      C   DMS(1,6,4)=  W*SZ                                            DRVSTR     309
          DMS(1,6,2)=  W                                               DRVSTR     310
          DMS(1,6,4)= -W*SZ                                            DRVSTR     311
          DMS(1,6,6)=  W*SX*2.                                         DRVSTR     312
      C                                                                DRVSTR     313
          DMS(2,4,3)=  W                                               DRVSTR     314
          DMS(2,4,4)=  W*SY*2.                                         DRVSTR     315
          DMS(2,5,4)= -W*SX                                            DRVSTR     316
      C   DMS(2,6,1)=  W                                               DRVSTR     317
      C   DMS(2,6,5)=  W*SZ                                            DRVSTR     318
          DMS(2,6,1)= -W                                               DRVSTR     319
          DMS(2,6,5)= -W*SZ                                            DRVSTR     320
          DMS(2,6,6)=  W*SY*2.                                         DRVSTR     321
      C                                                                DRVSTR     322
          DMS(3,4,2)= -W                                               DRVSTR     323
          DMS(3,4,4)=  W*SZ*2.                                         DRVSTR     324
          DMS(3,5,1)=  W                                               DRVSTR     325
          DMS(3,5,5)=  W*SZ*2.                                         DRVSTR     326
      C   DMS(3,6,4)=  W*SX                                            DRVSTR     327
      C   DMS(3,6,5)=  W*SY                                            DRVSTR     328
          DMS(3,6,4)= -W*SX                                            DRVSTR     329
          DMS(3,6,5)= -W*SY                                            DRVSTR     330
      C                                                                DRVSTR     331
          DO 76 J= 1,3                                                 DRVSTR     332
          DO 76 K= 1,6                                                 DRVSTR     333
          DO 76 L= 1,K                                                 DRVSTR     334
          DMS(J,L,K)= DMS(J,K,L)                                       DRVSTR     335
       76 CONTINUE                                                     DRVSTR     336
      C                                                                DRVSTR     337
      C CONTRACT DMS TO ACCOUNT FOR ANY IGNORED DOF'S                  DRVSTR     338
      C                                                                DRVSTR     339
          DO 77 L= 1,3                                                 DRVSTR     340
          K=O                                                          DRVSTR     341
          DO 78 J= 1,6                                                 DRVSTR     342
          IF(IDYDOF(I,J) .EQ. O) GO TO 78                              DRVSTR     343
```

```
      K=K+1
      DO 72 M=1,6
      DMS(L,K,M)= DMS(L,J,M)
   72 CONTINUE
   78 CONTINUE
      K=0
      DO 74 J=1,6
      IF (IDYDOF(I,J).EQ.0) GO TO 74
      K=K+1
      DO 79 M= 1,6
      DMS(L,M,K)= DMS(L,M,J)
   79 CONTINUE
   74 CONTINUE
   77 CONTINUE
C
C NOW FORM DERIVATIVES OF CG VARIABLES
C
      DO 81 II= 1,3
      L= NDOF(I)
      K= 0
      B= CMPLX(0.,0.)
      DO 82 J= 1,L
      DO 82 K= 1,L
      B= B + VECTS(2,J)*DMS(II,J,K)*VECTS(1,K)
   82 CONTINUE
      AKED= REAL(B) - CSCL*AIMAG(B)
      STRRDO(I,II)= STRRDN(I,II)
      STRRDN(I,II)= -AKED*FK
   81 CONTINUE
C
C LIST DERIVATIVES OF STORE VARIABLES
C
      WRITE(ITAPEW,9000) IDSTR(I)
      WRITE(ITAPEN,9000) IDSTR(I)
      WRITE(ITAPEW,9001) VAR(1),STRWDN(I)
      WRITE(ITAPEN,9001) VAR(1),STRWDN(I)
      DO 80 J=1,3
      K=J+3
      IF(IDYDOF(I,K).EQ.0) GO TO 80
      K=J+1
      WRITE(ITAPEW,9001) VAR(K),STRIDN(I,J)
      WRITE(ITAPEN,9001) VAR(K),STRIDN(I,J)
   80 CONTINUE
C
      DO 83 J= 1,3
      K= J+4
      WRITE(ITAPEW,9001) VAR(K),STRRDN(I,J)
   83 CONTINUE
      DO 84 J = 1, 6
      WRITE(ITAPEW,9001) VAR2(J), STRFDN(I,J)
   84 CONTINUE
      DO 90 II= 1,3
      L= NDOF(I)
      WRITE(ITAPEW,9003) I,II
      DO 90 J= 1,L
      WRITE(ITAPEW,9002) J,(DMS(II,J,K),K=1,L)
   90 CONTINUE
```

```
 400          WRITE(ITAPEW,9004) (VECTS(1,J),J=1,L)                      DRVSTR    401
              WRITE(ITAPEW,9005) (VECTS(2,J),J=1,L)                      DRVSTR    402
              WRITE(ITAPEW,9006) CSCL                                    DRVSTR    403
         9003 FORMAT(///10X,5HSTORE,I2,18H DERIVATIVES FOR S,I1/)        DRVSTR    404
         9002 FORMAT(10X,I1,2X,6(1PE15.5))                               DRVSTR    405
 405     9004 FORMAT(//,10X,18H U FLUTTER VECTORS,//,10X,6(1PE15.5),     DRVSTR    406
             A      //,10X,6(1PE15.5))                                   DRVSTR    407
         9005 FORMAT(//,10X,18H V FLUTTER VECTORS,//,10X,6(1PE15.5),     DRVSTR    408
             A      //10X,6(1PE15.5))                                    DRVSTR    409
         9006 FORMAT(//10X,6HCSCL =,1PE15.5)                             DRVSTR    410
 410      200 CONTINUE                                                   DRVSTR    411
        C                                                                DRVSTR    412
        C                                                                DRVSTR    413
         9000 FORMAT(///,10X, 28HDERIVATIVES FOR STORE NUMBER,I4)        DRVSTR    414
         9001 FORMAT(/,10X,A4,2X,1PE15.5)                                DRVSTR    415
 415    C                                                                DRVSTR    416
              RETURN                                                     DRVSTR    417
              END                                                        DRVSTR    418
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE     REFERENCES
    3 DRVSTR          1          416

VARIABLES     SN  TYPE            RELOCATION
 1603  A          COMPLEX                       REFS        5      56      59     168     170
                                             DEFINED       53      56     160     168
 1640  AKED       REAL                          REFS      172     175     271     274     284     287     370
                                             DEFINED      171     172     270     271     283     284     368
    3  AORD       REAL        ARRAY    INVERT   REFS       24
 1601  B          COMPLEX                       REFS        4      57      60     164     170   2*171     267
                                               2*270      282   2*283     366   2*368 DEFINED      54      57
                                                 161      164     170     264     267     279     282     363
                                                 366
 2217  BUF1       REAL        ARRAY             REFS       26     111     114     116     125     134     135
                                                 143      151     163     167 DEFINED     159
 4167  BUF2       REAL        ARRAY             REFS       26     118     125     143     151
                                             DEFINED      114     116
 6137  BUF3       REAL        ARRAY             REFS       27     151
 1605  C          COMPLEX                       REFS       28     164     168 DEFINED     163     167
    0  CHART      COMPLEX     ARRAY    F.P.     REFS        4      10     163     167     258     259   2*282
                                             DEFINED        1      59      60
  242  CSCL       REAL                 FLUT     REFS       32     171     270     283     368     402
10107  DELTA      REAL        ARRAY             REFS       27     102     114     116
 2034  DMM        REAL        ARRAY             REFS       11     224     235     245     267
                                             DEFINED      185     194     197     204     205     207     208
                                                 209      210     216     217     218     219     220     224
                                                 235      245
 1651  DMS        REAL        ARRAY             REFS        8     334     345     353     366     398
                                             DEFINED      300     304     305     306     309     310     311
                                                 313      314     315     318     319     320     322     323
                                                 324      325     328     329     334     345     353
 1617  FK         REAL                          REFS      175     271     284     370 DEFINED      72
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VARIABLES       SN  TYPE          RELOCATION
 1615  I            INTEGER                        REFS       59       60     2*78      113      114      116      173
                                                    174      188      189      190      231    2*233      241    2*243
                                                    249      254      257    2*273      274      280      281    2*286
                                                    287    2*290      291      292      303      342      350      361
                                                  2*369      370      375      376      377      378      381      383
                                                    384      389      392      395      396  DEFINED       51       76
                                                    110      133      158      179
    0  ICYCLE       INTEGER            STRCLU      REFS       29
 2100  IDDOF        INTEGER   ARRAY                REFS       11      257  DEFINED      233      243
  244  IDMODE       INTEGER   ARRAY    FLUT        REFS       32
   76  IDSTR        INTEGER   ARRAY    STORES      REFS       17      375      376
   40  IDYDOF       INTEGER   ARRAY    STORES      REFS       17      231      233      241      243      280      281
                                                    342      350      381
    2  IFLEX        INTEGER            INVERT      REFS       24
    5  IFMOD        INTEGER            LOCSTR      REFS       33       49  DEFINED       47       67
    3  IFMREF       INTEGER            LOCSTR      REFS       33
    1  IFSTRI       INTEGER            LOCSTR      REFS       33
 1650  II           INTEGER                        REFS      366    2*369      370      396      398
                                                DEFINED      360      394
    0  INVERT       INTEGER            INVERT      REFS       24
   41  IPERM        INTEGER   ARRAY    INVERT      REFS       24
  173  IPREV        INTEGER            INVERT      REFS       24
 1636  IRET       * INTEGER                        REFS      151
    2  ISTDOF       INTEGER   ARRAY    STORES      REFS       17
    1  ISTEP        INTEGER            STRCLU      REFS       29
 1614  ITAPEN       INTEGER                     DEFINED       50  I/O REFS      376      378      384
    2  ITAPEP       INTEGER            COMRWP      REFS       30
    0  ITAPER       INTEGER            COMRWP      REFS       30
    0  ITAPES       INTEGER   ARRAY    CTAPES      REFS       31       50       82       83       84       85       86
                                                     87       88       89       90       91
    1  ITAPEW       INTEGER            COMRWP      REFS       30  I/O REFS      375      377      383      389      392
                                                    396      398      400      401      402
    1  IUA2         INTEGER            INVERT      REFS       24
    4  IUMOD        INTEGER            LOCSTR      REFS       33       49       52       62
    2  IUMREF       INTEGER            LOCSTR      REFS       33
 1632  IUSTF        INTEGER                        REFS      109      111      131      134  DEFINED       96
    0  IUSTRI       INTEGER            LOCSTR      REFS       33
 1616  J            INTEGER                        REFS     2*56     2*57     2*78      113    2*114    2*116    2*167
                                                    185    2*194      223    2*224      231      233      235    2*245
                                                    257      258      259    2*267      280      281      285      300
                                                  2*334      342      345      350      353    2*366      380      382
                                                    383      384      388      389    2*392    2*398      400      401
                                                DEFINED       55       77      112      166      183      193      222
                                                    230      244      256      265      278      297      331      341
                                                    349      364      379      387      391      397      400      401
 1635  JCOL         INTEGER                        REFS      131      134      135      143      151      175
                                                DEFINED      174
 1634  JROW         INTEGER                        REFS      131      133      143      151      156      175
                                                DEFINED      173
 1633  K            INTEGER                        REFS      118      135      159    2*163      185    2*224      232
                                                    233      235      242      243      245      249    2*267    2*286
                                                    287      300      333    2*334      343      345      351      353
                                                  2*366      381      383      384      389      398
                                                DEFINED      118      135      159      162      184      223      229
                                                    232      239      242      255      266      285      298      332
                                                    340      343      348      351      362      365      380      382
                                                    388      398
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VARIABLES      SN  TYPE            RELOCATION
     7  KBPAGE     INTEGER              CLIST        REFS         15
  1613  KCOL       INTEGER                           REFS         49        52        55       109       111       112       118
                                                      151
     1  KCONST     INTEGER              STORES       REFS         17       289
     0  KFREE      INTEGER              KLUFF        REFS          9        64
     4  KLABEL     INTEGER              CLIST        REFS         15
     0  KOUNT      INTEGER              CLIST        REFS         15
    11  KOUNTH     INTEGER              CLIST        REFS         15
    12  KOUNTI     INTEGER              CLIST        REFS         15
     1  KPAGE      INTEGER              CLIST        REFS         15
  1612  KROW       INTEGER                           REFS         49        51       109       110       125
     5  KTPAGE     INTEGER              CLIST        REFS         15
  1644  L          INTEGER                           REFS      2*235       241       243       245       256       265       266
                                                    2*282        300     2*334     2*345     2*353       364       365       397
                                                      398        400       401   DEFINED       234       240       254       281
                                                      299        333       339       361       395
     2  LINES      INTEGER              CLIST        REFS         15
    10  LINESG     INTEGER              CLIST        REFS         15
     3  LINEST     INTEGER              CLIST        REFS         15
  1645  M          INTEGER                           REFS        258       259     2*345     2*353   DEFINED       257       344
                                                      352
     2  M1         INTEGER              STRCLU       REFS         29
     3  M2         INTEGER              STRCLU       REFS         29
     4  M3         INTEGER              STRCLU       REFS         29
     5  M4         INTEGER              STRCLU       REFS         29
  2213  NAME       INTEGER    ARRAY                  REFS         12        49
  2215  NAME1      INTEGER    ARRAY                  REFS         26       109       131
  1637  ND         INTEGER                           REFS        159       162       166   DEFINED       156
  2136  NDOF       INTEGER    ARRAY                  REFS         11       254       361       395   DEFINED       249
   174  NDOFT      INTEGER              INVERT       REFS         24       158
   243  NMODE      INTEGER              FLUT         REFS         32
     6  NPAGE      INTEGER              CLIST        REFS         15
     0  NROWS      INTEGER              F.P.         REFS       2*10   DEFINED         1
    77  NSTOR      INTEGER    ARRAY     INVERT       REFS         24       173       174
  1607  NTYME      INTEGER                           REFS         64   DEFINED        44        68
  1610  NU         INTEGER                           REFS         59   DEFINED        45        65
     0  NUMSTR     INTEGER              STORES       REFS         17       179
  1611  NV         INTEGER                           REFS         60   DEFINED        46        66
  1620  N1         INTEGER                           REFS        125       151   DEFINED        82  I/O REFS       108       118
                                                      120        149       157       159
  1631  N10      * INTEGER                        DEFINED         91
  1621  N2         INTEGER                           REFS        125       143   DEFINED        83  I/O REFS       132       135
                                                      141
  1622  N3         INTEGER                           REFS        125       151   DEFINED        84  I/O REFS       148
  1623  N4         INTEGER                           REFS        125       143       151   DEFINED        85
                                                 I/O REFS        150
  1624  N5         INTEGER                           REFS        125       143   DEFINED        86
  1625  N6         INTEGER                           REFS        125   DEFINED        87
  1626  N7         INTEGER                           REFS        125   DEFINED        88
  1627  N8         INTEGER                           REFS        125   DEFINED        89
  1630  N9       * INTEGER                        DEFINED         90
  2143  ROE        REAL       ARRAY                  REFS         12        52        56        57
   362  SCALE      REAL       ARRAY     STORES       REFS         17
    11  STPOLD     REAL                 STRCLU       REFS         29
   653  STRFDN     REAL       ARRAY     STORES       REFS         17        78       392   DEFINED       175
   615  STRFDO     REAL       ARRAY     STORES       REFS         17   DEFINED        78
   463  STRFI      REAL       ARRAY     STORES       REFS         17
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VARIABLES     SN  TYPE            RELOCATION
  557  STRFN      REAL       ARRAY    STORES     REFS       17
  521  STRFO      REAL       ARRAY    STORES     REFS       17
  305  STRIDN     REAL       ARRAY    STORES     REFS       17       286     2*290      383      384
                                              DEFINED      287       291       292
  266  STRIDO     REAL       ARRAY    STORES     REFS       17   DEFINED       286
  122  STRII      REAL       ARRAY    STORES     REFS       17
  160  STRIN      REAL       ARRAY    STORES     REFS       17
  141  STRIO      REAL       ARRAY    STORES     REFS       17
  343  STRRDN     REAL       ARRAY    STORES     REFS       17       369       389  DEFINED       370
  324  STRRDO     REAL       ARRAY    STORES     REFS       17   DEFINED       369
  177  STRRI      REAL       ARRAY    STORES     REFS       17
  235  STRRN      REAL       ARRAY    STORES     REFS       17       188       189      190
  216  STRRO      REAL       ARRAY    STORES     REFS       17
  261  STRWDN     REAL       ARRAY    STORES     REFS       17       273       377      378  DEFINED      274
  254  STRWDO     REAL       ARRAY    STORES     REFS       17   DEFINED       273
  103  STRWI      REAL       ARRAY    STORES     REFS       17
  115  STRWN      REAL       ARRAY    STORES     REFS       17       303
  110  STRWO      REAL       ARRAY    STORES     REFS       17
 1641  SX         REAL                           REFS      208       209     2*210      217      218    2*220     306
                                                  311      315       328   DEFINED      188
 1642  SY         REAL                           REFS      204     2*205       209      216      219    2*220     305
                                                  314      320       329   DEFINED      189
 1643  SZ         REAL                           REFS      197     2*205       207    2*210      218      219     310
                                                  319      323       325   DEFINED      190
    0  UMOD       COMPLEX    ARRAY    FLUT       REFS        4        32        56
 2025  VAR        REAL       ARRAY               REFS        8       377       378      383      384      389
                                              DEFINED       39
10145  VAR2       REAL       ARRAY               REFS       37       392   DEFINED       38
    0  VECTS      COMPLEX    ARRAY     F.P.      REFS        4        10     2*267    2*366      400      401
                                              DEFINED        1       258       259
  240  VF         REAL                FLUT       REFS       32        72
  120  VMOD       COMPLEX    ARRAY    FLUT       REFS        4        32        57
   10  VNEW       REAL                STRCLU     REFS       29
    7  VOLD       REAL                STRCLU     REFS       29
    6  VS         REAL                STRCLU     REFS       29
 1647  W          REAL                           REFS      304       305       306      309      310      311     313
                                                  314      315       318       319      320      322      323     324
                                                  325      328       329   DEFINED      303
  241  WW         REAL                FLUT       REFS       32       175
 1646  X          REAL                           REFS      291       292   DEFINED      290
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS         REFERENCES
       CHANGE                 1             102
       DCLOSE                 1              62
       GEDLAB                 6              49       109       131
       GETROW                 4              52       111       134
       INV                   13             125
       MESAGE                 3              42
       PROGNA                 2              41
       TIMEB                  2             101       103       124       126       142      144      152      177
       TRIXY                 11             151
       TRPOSE                 8             143

INLINE FUNCTIONS    TYPE   ARGS        DEF LINE   REFERENCES
       AIMAG      REAL        1  INTRIN             171       270       283       368
       CMPLX      COMPLEX     2  INTRIN              53        54       160       161      264      279      363
```

```
INLINE FUNCTIONS    TYPE     ARGS          DEF LINE   REFERENCES
        REAL        REAL       1  INTRIN                  171        270        283        368

STATEMENT LABELS                      DEF LINE    REFERENCES
     0  3                                58          55
    17  4                                48          69
     0  5                                61          51
    75  6                                70          64
     0  10                              186         183        184
     0  20                              195         193
     0  30                              225         222        223
     0  35                              236         234
   436  40                              237         230        231
     0  44                              246         244
   464  45                              247         240        241
     0  50                              260         256
     0  60                              268         265        266
   602  70                              288         278        280
     0  72                              346         344
   612  73                              293         289
   747  74                              355         349        350
     0  75                              301         297        298        299
     0  76                              335         331        332        333
     0  77                              356         339
   722  78                              347         341        342
     0  79                              354         352
  1073  80                              385         379        381
     0  81                              371         360
     0  82                              367         364        365
     0  83                              390         387
     0  84                              393         391
     0  90                              399         394        397
     0  95                               78          76         77
   160  101                             116         113
   161  102                             117         112        115
     0  103                             119         110
     0  105                             136         133
     0  120                             165         162
     0  130                             169         166
     0  140                             176         158
     0  200                             410         179
  1550  9000      FMT                   413         375        376
  1556  9001      FMT                   414         377        378        383        384        389        392
  1523  9002      FMT                   404         398
  1515  9003      FMT                   403         396
  1526  9004      FMT                   405         400
  1535  9005      FMT                   407         401
  1544  9006      FMT                   409         402

LOOPS   LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   24   5          I          51  61       40B                 EXT REFS   NOT INNER
   36   3          J          55  58       1[illegible]             OPT
  100   95         I          76  78       13[illegible]                NOT INNER
  104   95         J          77  78        3B       INSTACK
  145   103        I         110 119       26B                 EXT REFS   NOT INNER
  154   102        J         112 117        6B       INSTACK
  207   105        I         133 136       12B                 EXT REFS
  246   140        I         158 176       60B                 EXT REFS   NOT INNER
```

VARIABLES		SN TYPE		RELOCATION								
1634	K	INTEGER			REFS	318	357	DEFINED	318	357		
7	KBPAGE	INTEGER		CLIST	REFS	40						
1562	KCOL	INTEGER			REFS	61	64	74	251	254		
1621	KK	INTEGER			REFS	284	285	297	312	313	327	
					DEFINED	272	367					
4	KLABEL	INTEGER		CLIST	REFS	40						
24	KLUB	INTEGER		KLUES	REFS	27						
4	KLUBAL	INTEGER		KLUES	REFS	27						
3	KLUMD	INTEGER		KLUES	REFS	27						
1	KLUNAL	INTEGER		KLUES	REFS	27						
25	KLUQ	INTEGER		KLUES	REFS	27						
0	KLUSE	INTEGER		KLUES	REFS	27						
1616	KNEW	INTEGER			REFS	226	229	231	DEFINED	223	224	
1576	KOLD	INTEGER			REFS	226	DEFINED	129	229			
0	KOUNT	INTEGER		CLIST	REFS	40	122	125	136	200	203	205
					207	210	237	240	242	246	267	309
					311	314	316	320	321	330	334	336
					338	341	343	359	371	374	376	378
					382	DEFINED	119	122	125	136	201	205
					207	210	238	242	246	264	267	270
					311	314	316	320	322	332	336	338
					341	343	359	366	372	376	378	382
11	KOUNTH	INTEGER		CLIST	REFS	40	203	240	309	334	374	
12	KOUNTI	INTEGER		CLIST	REFS	40						
1600	KOWNT	INTEGER			REFS	141	209	DEFINED	131	141		
1	KPAGE	INTEGER		CLIST	REFS	40						
1561	KROW	INTEGER			REFS	61	63	64	73	145	251	253
					280							
5	KTPAGE	INTEGER		CLIST	REFS	40						
0	KVAR	INTEGER		F.P.	REFS	2*6	DEFINED	1				
1615	LEFT	INTEGER			REFS	201	238	322	332	372		
					DEFINED	200	237	321	330	371		
2	LINES	INTEGER		CLIST	REFS	40	119	200	201	237	238	264
					270	321	322	330	332	366	371	372
10	LINESG	INTEGER		CLIST	REFS	40						
3	LINEST	INTEGER		CLIST	REFS	40						
121	MBDOF	INTEGER	ARRAY	BAL	REFS	30						
1627	MEMB	INTEGER			REFS	318	DEFINED	287				
26	MORBAL	INTEGER		KLUES	REFS	27						
5	MSADD	INTEGER		KLUES	REFS	27						
1636	NAME	INTEGER	ARRAY		REFS	6	61	64	251			
13	NBAR	INTEGER		KLUES	REFS	27						
20	NCYC	INTEGER		KLUES	REFS	27	118					
1635	NEED	INTEGER			REFS	332	DEFINED	331				
14	NFIX	INTEGER		KLUES	REFS	27						
0	NMBAL	INTEGER		BAL	REFS	30	84	85	180	181	329	331
					344							
243	NMODE	INTEGER		FLUT	REFS	38						
21	NNN	INTEGER		KLUES	REFS	27	100	102	103	DEFINED	103	
1640	NOTE	INTEGER	ARRAY		REFS	8	318	357	DEFINED	43		
6	NPAGE	INTEGER		CLIST	REFS	40						
6	NPASS	INTEGER		KLUES	REFS	27						
1575	NREDES	INTEGER			REFS	121	204	241	266	310	335	375
					DEFINED	118						
1624	NT	INTEGER			REFS	286	345	364	380	DEFINED	276	286
					345							
12	NVAR	INTEGER		COLS	REFS	33						

```
VARIABLES      SN  TYPE          RELOCATION
  100  IUDUM2     INTEGER            PLACES    REFS       10       56       57
  102  IUDUM3     INTEGER            PLACES    REFS       10
    4  IUGO1      INTEGER            PLACES    REFS       10
    5  IUGO2      INTEGER            PLACES    REFS       10
    6  IUGO3      INTEGER            PLACES    REFS       10
    7  IUGO4      INTEGER            PLACES    REFS       10
  140  IUINCK     INTEGER            PLACES    REFS       10
  136  IUINCM     INTEGER            PLACES    REFS       10
    0  IUIN1      INTEGER            PLACES    REFS       10
    1  IUIN2      INTEGER            PLACES    REFS       10
   30  IUKS       INTEGER            PLACES    REFS       10
  104  IUL        INTEGER            PLACES    REFS       10
  114  IULR       INTEGER            PLACES    REFS       10
   56  IUMD       INTEGER            PLACES    REFS       10
   64  IUMDB      INTEGER            PLACES    REFS       10
   36  IUMDBI     INTEGER            PLACES    REFS       10
   60  IUMEMF     INTEGER            PLACES    REFS       10
   24  IUMEMN     INTEGER            PLACES    REFS       10
   50  IUMEMO     INTEGER            PLACES    REFS       10
  124  IUMODK     INTEGER            PLACES    REFS       10
  122  IUMODM     INTEGER            PLACES    REFS       10
    2  IUOUT1     INTEGER            PLACES    REFS       10
    3  IUOUT2     INTEGER            PLACES    REFS       10
  134  IUPH       INTEGER            PLACES    REFS       10
  126  IUPHT      INTEGER            PLACES    REFS       10
  120  IUPHTF     INTEGER            PLACES    REFS       10
   17  IUPR       INTEGER            PLACES    REFS       10  I/O REFS      121      124      135      204      206
                                                209      241      244      245      266      268      310      312
                                                313      315      318      335      337      340      342      357
                                                364      365      375      377      380      381
  132  IUQ        INTEGER            PLACES    REFS       10
  130  IUQT       INTEGER            PLACES    REFS       10
   10  IUSCR      INTEGER            PLACES    REFS       10
   26  IUSTFN     INTEGER            PLACES    REFS       10
   62  IUSTFO     INTEGER            PLACES    REFS       10
   74  IUWT       INTEGER            PLACES    REFS       10
   46  IUWTI      INTEGER            PLACES    REFS       10
   22  IUY        INTEGER            PLACES    REFS       10
  106  IUYT       INTEGER            PLACES    REFS       10
  110  IUZ        INTEGER            PLACES    REFS       10
  112  IUZR       INTEGER            PLACES    REFS       10
   11  IWPUT      INTEGER            COLS      REFS       33
 1564  J          INTEGER                      REFS       79       89       93       94      318    2*323    2*324
                                                357  DEFINED       71       79       89      298      300      302
                                                304      305      351      354
    0  JCHART     INTEGER   ARRAY    F.P.      REFS        6      287  DEFINED        1
   21  JDRV       INTEGER            COLS      REFS       33       76      151      291
   22  JDRVO      INTEGER            COLS      REFS       33
   14  JINITT     INTEGER            COLS      REFS       33      289
   16  JMAXT      INTEGER            COLS      REFS       33      150      301
   15  JMINT      INTEGER            COLS      REFS       33      149      282
   20  JNEWT      INTEGER            COLS      REFS       33       75      173      281
   17  JOLDT      INTEGER            COLS      REFS       33       75      148      290
   23  JSPR1      INTEGER            COLS      REFS       33
   24  JSPR2      INTEGER            COLS      REFS       33
   25  JSPR3      INTEGER            COLS      REFS       33
   13  JWPUT      INTEGER            COLS      REFS       33      147      288
```

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VARIABLES      SN  TYPE            RELOCATION
   141  IFINCK     INTEGER              PLACES      REFS       10
   137  IFINCM     INTEGER              PLACES      REFS       10
    31  IFKS       INTEGER              PLACES      REFS       10
   105  IFL        INTEGER              PLACES      REFS       10
   115  IFLR       INTEGER              PLACES      REFS       10
    57  IFMD       INTEGER              PLACES      REFS       10
    65  IFMDB      INTEGER              PLACES      REFS       10
    37  IFMDBI     INTEGER              PLACES      REFS       10
    61  IFMEMF     INTEGER              PLACES      REFS       10
    25  IFMEMN     INTEGER              PLACES      REFS       10
    51  IFMEMO     INTEGER              PLACES      REFS       10
   125  IFMODK     INTEGER              PLACES      REFS       10
   123  IFMODM     INTEGER              PLACES      REFS       10
   135  IFPH       INTEGER              PLACES      REFS       10
   127  IFPHT      INTEGER              PLACES      REFS       10
   121  IFPHTF     INTEGER              PLACES      REFS       10
   133  IFQ        INTEGER              PLACES      REFS       10
   131  IFQT       INTEGER              PLACES      REFS       10
    11  IFSCR      INTEGER              PLACES      REFS       10
    27  IFSTFN     INTEGER              PLACES      REFS       10
    63  IFSTFO     INTEGER              PLACES      REFS       10
    12  IFS1       INTEGER              PLACES      REFS       10
    13  IFS2       INTEGER              PLACES      REFS       10
    14  IFS3       INTEGER              PLACES      REFS       10
    15  IFS4       INTEGER              PLACES      REFS       10
    75  IFWT       INTEGER              PLACES      REFS       10
    47  IFWTI      INTEGER              PLACES      REFS       10
    23  IFY        INTEGER              PLACES      REFS       10
   107  IFYT       INTEGER              PLACES      REFS       10
   111  IFZ        INTEGER              PLACES      REFS       10
   113  IFZR       INTEGER              PLACES      REFS       10
    10  IINITT     INTEGER              COLS        REFS       33
     2  IMAXT      INTEGER              COLS        REFS       33
     1  IMINT      INTEGER              COLS        REFS       33
     7  IMINTO     INTEGER              COLS        REFS       33
     4  IOLDT      INTEGER              COLS        REFS       33
     5  IOLDW      INTEGER              COLS        REFS       33
     0  IPOS       INTEGER     ARRAY    FILE        REFS        7      37
     2  IRED       INTEGER              KLUES       REFS       27
     6  ISRAT      INTEGER              COLS        REFS       33
     0  IT         INTEGER              COLS        REFS       33
    20  IUA        INTEGER              PLACES      REFS       10
    66  IUADD      INTEGER              PLACES      REFS       10
    40  IUADDI     INTEGER              PLACES      REFS       10
    32  IUB        INTEGER              PLACES      REFS       10
    70  IUBAL      INTEGER              PLACES      REFS       10
    42  IUBALI     INTEGER              PLACES      REFS       10
   116  IUBR       INTEGER              PLACES      REFS       10
    52  IUBT       INTEGER              PLACES      REFS       10
    16  IUCD       INTEGER              PLACES      REFS       10
    72  IUDESF     INTEGER              PLACES      REFS       10
    44  IUDESI     INTEGER              PLACES      REFS       10
    54  IUDESN     INTEGER              PLACES      REFS       10      56      64      65     251     254     256
                                                 DEFINED       56
    34  IUDESO     INTEGER              PLACES      REFS       10      57      61      66      74      82
                                                 DEFINED       57
    76  IUDUM1     INTEGER              PLACES      REFS       10
```

```
VARIABLES      SN  TYPE              RELOCATION
    0  CHART        REAL         ARRAY      F.P.      REFS          6         74        75        76       147       148       149
                                                           150        151        254       281       282       288       289       290
                                                           291        301     DEFINED        1        75       173
  242  CSCL         REAL                    FLUT      REFS         38
   15  D            REAL                    KLUES     REFS         27        153       299
   27  DBAL         REAL                    KLUES     REFS         27        182       352
   16  DEL          REAL                    KLUES     REFS         27        110       111
 1617  DEMU         REAL                              REFS        232     DEFINED       231
 1631  DRV          REAL                              REFS        294        318    DEFINED       291
  215  DRVMB        REAL         ARRAY      BAL       REFS         30         87        88       183       184       192       348
                                                           357
  241  DRVMBO       REAL         ARRAY      BAL       REFS         30
 1567  DVDES        REAL                              REFS        110        111       112       113       114       124       224
                                                       DEFINED        102        106
 1633  DVEL         REAL                              REFS        296        318       350       357   DEFINED       294       348
 1602  DVLIN        REAL                              REFS        171        192       209     2*217       218       219       224
                                                           244        245     DEFINED       143       171       192
 1601  DVOLD        REAL                              REFS        218        244       245   DEFINED       133       219
    5  DW           REAL                    WAYTS     REFS         39        170       177       191       198       209       268
                                                       DEFINED        142        170       191
 1612  DWEL         REAL                              REFS        170        171       191       192       294       295       318
                                                           348        349        357   DEFINED       169       190       292       346
 1632  DWELT        REAL                              REFS        318        357   DEFINED       293       347
   12  DWMAX        REAL                    KLUES     REFS         27
 1614  DWMB         REAL                              REFS        259        268   DEFINED       198
 1613  DWST         REAL                              REFS        198        258       268   DEFINED       177
 1563  EMU          REAL                              REFS         78         88        94       157       184       209       231
                                                           232    DEFINED         70        78        88        94       232
   11  EPS1         REAL                    KLUES     REFS         27        106
   17  EPS2         REAL                    KLUES     REFS         27        112
 1565  I            INTEGER                           REFS         74       2*75        76      2*86        87        88       147
                                                           148        149        150       151       173       182       183     3*184
                                                           185        187      2*190       192       254       281       282       287
                                                           288        289        290       291       301     2*346     2*347       348
                                                           352        353      4*357   DEFINED        73        85       145       181
                                                           253        280        344
   22  IBAND        INTEGER                 KLUES     REFS         27
    1  IDBAL        INTEGER      ARRAY      BAL       REFS         30        357
    3  IDENS        INTEGER                 COLS      REFS         33
  244  IDMODE       INTEGER      ARRAY      FLUT      REFS         38
    7  IDNOPT       INTEGER                 KLUES     REFS         27
   21  IFA          INTEGER                 PLACES    REFS         10
   67  IFADD        INTEGER                 PLACES    REFS         10
   41  IFADDI       INTEGER                 PLACES    REFS         10
   33  IFB          INTEGER                 PLACES    REFS         10
   71  IFBAL        INTEGER                 PLACES    REFS         10
   43  IFBALI       INTEGER                 PLACES    REFS         10
  117  IFBR         INTEGER                 PLACES    REFS         10
   53  IFBT         INTEGER                 PLACES    REFS         10
   73  IFDESF       INTEGER                 PLACES    REFS         10
   45  IFDESI       INTEGER                 PLACES    REFS         10
   55  IFDESN       INTEGER                 PLACES    REFS         10         58        64       251   DEFINED        58
   35  IFDESO       INTEGER                 PLACES    REFS         10         59        61   DEFINED        59
   77  IFDUM1       INTEGER                 PLACES    REFS         10
  101  IFDUM2       INTEGER                 PLACES    REFS         10         58        59
  103  IFDUM3       INTEGER                 PLACES    REFS         10
   23  IFIN         INTEGER                 KLUES     REFS         27
```

```
        5              15H       (POUNDS),/)                           FLTDES  401
   9003 FORMAT(10X,I5,3(F15.4,5X),/)                                   FLTDES  402
   9004 FORMAT(10X,51HAN ACCEPTABLE PREDICTED STEP SIZE HAS BEEN OBTAINED. FLTDES 403
        1              21H - ACCEPT THIS DESIGN,/)                     FLTDES  404
   9005 FORMAT(10X,41HTHE DESIRED STEP SIZE CANNOT BE ATTAINED.  ,     FLTDES  405
        1      /,10X,52HALL DESIGN VARIABLES ARE AT CONSTRAINTS OR MAXIMUM . FLTDES 406
        2              37HCUT VALUES. ACCEPT THE LAST REDESIGN )       FLTDES  407
   9006 FORMAT(//,10X,  34H..........WEIGHT SUMMARY...........,        FLTDES  408
        1   ///,10X,45HINITIAL REFERENCE WEIGHT.......................,F12.4, FLTDES 409
        2    //,10X,45HSTRUCT. WEIGHT CHANGE IN THIS REDESIGN.......,F12.4, FLTDES 410
        3    //,10X,45HMASS BAL. WEIGHT CHANGE IN THIS REDESIGN.....,F12.4, FLTDES 411
        4    //,10X,45HTOTAL WEIGHT CHANGE IN THIS REDESIGN.........,F12.4, FLTDES 412
        5  ////,10X,45HCUMULATIVE STRUCT. WEIGHT CHANGE.............,F12.4, FLTDES 413
        6    //,10X,45HCUMULATIVE MASS BAL. WEIGHT CHANGE...........,F12.4, FLTDES 414
        7    //,10X,45HCUMULATIVE TOTAL WEIGHT CHANGE...............,F12.4, FLTDES 415
        8    //,10X,45HPERCENTAGE WEIGHT CHANGE (CUMULATIVE)........,F12.4, FLTDES 416
        9    //,10X,45HTOTAL NEW WEIGHT.............................,F12.4, FLTDES 417
        A    //,)                                                      FLTDES  418
   9007 FORMAT(10X,46H********** FLUTTER CRITICAL ELEMENTS (REDESIGN,   FLTDES  419
        1              20H DETAILS) **********,/)                      FLTDES  420
   9008 FORMAT(10X,42H********** NON-CRITICAL ELEMENTS (REDESIGN,      FLTDES  421
        1              20H DETAILS) **********,/)                      FLTDES  422
   9009 FORMAT(/,10X,    6HMEMBER,30H     DERIVATIVE       OLD GAGE,   FLTDES  423
        1                  45H       NEW GAGE        DELTA W       DELTA V,  FLTDES 424
        2                  15H  DELTA W (CUM), 12H  CONSTRAINT,/)      FLTDES  425
   9010 FORMAT(/,10X,I6,6F15.4,4X,2A4)                                 FLTDES  426
   9011 FORMAT(/,10X,    32H**** MASS BALANCE VARIABLES ****,/)        FLTDES  427
   9012 FORMAT(/,10X,    6HMEMBER,30H     DERIVATIVE           OLD W,  FLTDES  428
        1                  45H          NEW W        DELTA W       DELTA V,  FLTDES 429
        2                  15H  DELTA W (CUM), 12H  CONSTRAINT,/)      FLTDES  430
   9013 FORMAT(/,10X,    9HTHERE ARE,I4,    26H FLUTTER CRITICAL ELEMENTS, FLTDES 431
        1        /,10X,I4,27H ARE CONSTRAINED BY MAX CUT,              FLTDES  432
        2        /,10X,I4,28H ARE CONSTRAINED BY MAX GAGE)             FLTDES  433
   9014 FORMAT(/,10X,    9HTHERE ARE,I4,    22H NON-CRITICAL ELEMENTS, FLTDES  434
        1        /,10X,I4,28H ARE CONSTRAINED BY MIN GAGE,             FLTDES  435
        2        /,10X,I4,26H ARE CONSTRAINED BY STRESS)               FLTDES  436
   9015 FORMAT(10X,49HIN THIS REDESIGN CYCLE, THESE ELEMENTS ACCOUNTED ,  FLTDES 437
        1              21HFOR A WGHT. CHANGE OF,F9.3,19H AND A (PREDICTED) , FLTDES 438
        2              12HVEL. STEP OF,F9.3)                           FLTDES  439
  C                                                                    FLTDES  440
          RETURN                                                       FLTDES  441
          END                                                          FLTDES  442
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 FLTDES	1	440

VARIABLES	SN	TYPE	RELOCATION							
1577 A		REAL		REFS	228	231	DEFINED	130	228	
1607 BOT		REAL		REFS	158	161	185	187	300	353
				DEFINED	153	182	299	352		
1574 BOT2		REAL		REFS	2*116	DEFINED	114			

```
      KOUNT=KOUNT+3
      DO 360 I=1,NMBAL
      NT=NT+1
      DWEL=VMBNEW(I)-VMBOLD(I)
      DWELT=VMBNEW(I)-VMBIN(I)
      DVEL=DWEL*DRVMB(I)
      SMDWEL=SMDWEL+DWEL
      SMDVEL=SMDVEL+DVEL
      J=1
      BOT=DBAL*VMBOLD(I)
      IF(VMBNEW(I).GT.BOT) GO TO 350
      J=2
      N2=N2+1
  350 CONTINUE
      WRITE(IUPR,9010) IDBAL(I),DRVMB(I),VMBOLD(I),VMBNEW(I),DWEL,DVEL,
     1                 DWELT,(NOTE(K,J),K=1,2)
      KOUNT=KOUNT+2
  360 CONTINUE
C
  400 CONTINUE
C
      WRITE(IUPR,9013) NT,N2,N3
      WRITE(IUPR,9015) SMDWEL, SMDVEL
      KOUNT=LINES
      KK=1
      GO TO 270
C
  500 CONTINUE
      LEFT=LINES-KOUNT
      IF(LEFT.LT.5) KOUNT=LINES
      CALL TITLES(2)
      IF(KOUNT.GT.KOUNTH) GO TO 510
      WRITE(IUPR,9000) NREDES
      KOUNT=KOUNT+3
      WRITE(IUPR,9008)
      KOUNT=KOUNT+2
  510 CONTINUE
      WRITE(IUPR,9014) NT,N2,N3
      WRITE(IUPR,9015) SMDWEL,SMDVEL
      KOUNT=KOUNT+5
C
 9999 CONTINUE
      CALL TIMEB(11,11HFROM FLTDES)
      CALL MESAGE(2,6,6HFLTDES)
C
C
 9000 FORMAT(/,10X,   24HFLUTTER REDESIGN CYCLE =,I3,/)
 9001 FORMAT(//,10X,  36HDESIRED FLUTTER VELOCITY STEP SIZE =,F11.4,
     1                 6H KNOTS,
     2        //,10X, 47HA LINEARLY PREDICTED STEP SIZE WILL BE ACCEPTED
     3                20H IF IT FALLS BEWTEEN,F11.4,4H AND,F11.4,
     4                 6H KNOTS,/)
 9002 FORMAT(/,10X,   46HITERATION HISTORY TO OBTAIN ACCEPTABLE FLUTTER,
     1                16H SPEED STEP SIZE,
     2       //,10X,   5HTRIAL, 15H       TARGET  ,5X,
     3                15H LIN. STEP SIZE,5X,   15H   WGHT. CHANGE,
     4        /,10X,5X,15H     DERIVATIVE,5X,   15H        (KNOTS),5X,
```

```
      NT=NT+1                                                           FLTDES   287
      MEMB=JCHART(1,I)                                                  FLTDES   288
      WPUT=CHART(JWPUT,I)                                               FLTDES   289
      TINITT=CHART(JINITT,I)                                            FLTDES   290
      TOLD=CHART(JOLDT,I)                                               FLTDES   291
      DRV=CHART(JDRV,I)                                                 FLTDES   292
      DWEL=WPUT*(TNEW-TOLD)                                             FLTDES   293
      DWELT=WPUT*(TNEW-TINITT)                                          FLTDES   294
      DVEL=DWEL*DRV                                                     FLTDES   295
      SMDWEL=SMDWEL+DWEL                                                FLTDES   296
      SMDVEL=SMDVEL+DVEL                                                FLTDES   297
      IF(KK.EQ.1) GO TO 280                                             FLTDES   298
      J=1                                                               FLTDES   299
      BOT=D*TOLD                                                        FLTDES   300
      IF(TNEW.EQ.BOT) J=2                                               FLTDES   301
      TMAX=CHART(JMAXT,I)                                               FLTDES   302
      IF(TNEW.EQ.TMAX) J=3                                              FLTDES   303
      GO TO 290                                                         FLTDES   304
  280 J=4                                                               FLTDES   305
      IF(TMIN.EQ.TMINAB) J=5                                            FLTDES   306
C                                                                       FLTDES   307
  290 CONTINUE                                                          FLTDES   308
      CALL TITLES(2)                                                    FLTDES   309
      IF(KOUNT.GT.KOUNTH) GO TO 292                                     FLTDES   310
      WRITE(IUPR,9000) NREDES                                           FLTDES   311
      KOUNT=KOUNT+3                                                     FLTDES   312
      IF(KK.EQ.0) WRITE(IUPR,9007)                                      FLTDES   313
      IF(KK.EQ.1) WRITE(IUPR,9008)                                      FLTDES   314
      KOUNT=KOUNT+2                                                     FLTDES   315
      WRITE(IUPR,9009)                                                  FLTDES   316
      KOUNT=KOUNT+3                                                     FLTDES   317
  292 CONTINUE                                                          FLTDES   318
      WRITE(IUPR,9010) MEMB,DRV,TOLD,TNEW,DWEL,DVEL,DWELT,              FLTDES   319
     1                (NOTE(K,J),K=1,2)                                 FLTDES   320
      KOUNT=KOUNT+2                                                     FLTDES   321
      LEFT=LINES-KOUNT                                                  FLTDES   322
      IF(LEFT.LT.2) KOUNT=LINES                                         FLTDES   323
      IF(J.EQ.2.OR.J.EQ.4) N2=N2+1                                      FLTDES   324
      IF(J.EQ.3.OR.J.EQ.5) N3=N3+1                                      FLTDES   325
  300 CONTINUE                                                          FLTDES   326
C                                                                       FLTDES   327
      IF(KK.EQ.1) GO TO 500                                             FLTDES   328
C                                                                       FLTDES   329
      IF(NMBAL.EQ.0) GO TO 400                                          FLTDES   330
      LEFT=LINES-KOUNT                                                  FLTDES   331
      NEED=11+(2*NMBAL)                                                 FLTDES   332
      IF(LEFT.LT.NEED) KOUNT=LINES                                      FLTDES   333
      CALL TITLES(2)                                                    FLTDES   334
      IF(KOUNT.GT.KOUNTH) GO TO 310                                     FLTDES   335
      WRITE(IUPR,9000) NREDES                                           FLTDES   336
      KOUNT=KOUNT+3                                                     FLTDES   337
      WRITE(IUPR,9007)                                                  FLTDES   338
      KOUNT=KOUNT+2                                                     FLTDES   339
  310 CONTINUE                                                          FLTDES   340
      WRITE(IUPR,9011)                                                  FLTDES   341
      KOUNT=KOUNT+3                                                     FLTDES   342
      WRITE(IUPR,9012)                                                  FLTDES   343
```

```
      KOLD=KNEW
C
  150 DEMU=KNEW*A*EMU
      EMU=EMU+DEMU
      GO TO 50
C
C
  200 CONTINUE
      LEFT=LINES-KOUNT
      IF(LEFT.LT.2) KOUNT=LINES
      CALL TITLES(2)
      IF(KOUNT.GT.KOUNTH) GO TO 210
      WRITE(IUPR,9000) NREDES
      KOUNT=KOUNT+3
  210 CONTINUE
      IF(DVLIN.NE.DVOLD) WRITE(IUPR,9004)
      IF(DVLIN.EQ.DVOLD) WRITE(IUPR,9005)
      KOUNT=KOUNT+2
C
C
C THE DESIRED STEP HAS BEEN ACHIEVED. WRITE OUT THE NEW DESIGN ARRAY.
C
      CALL PUDLAB(8HFLTDES01,IUDESN,NAME,IFDESN,KROW,KCOL)
C
      DO 250 I=1,KROW
  250 CALL PUTROW(IUDESN,2,CHART(1,I),KCOL)
C
      CALL DCLOSE(IUDESN)
C
      WST=WST+DWST
      WMB=WMB+DWMB
      WBOTH=WST+WMB
      WPRES=WINITT+WBOTH
      WPCT=100.*(WBOTH/WINITT)
C
      KOUNT=LINES
      CALL TITLES(2)
      WRITE(IUPR,9000) NREDES
      KOUNT=KOUNT+3
      WRITE(IUPR,9006) WINITT,DWST,DWMB,DW,WST,WMB,WBOTH,WPCT,WPRES
C
      KOUNT=LINES
C
      KK=0
  270 CONTINUE
      SMDWEL=0.0
      SMDVEL=0.0
      NT=0
      N2=0
      N3=0
C
      DO 300 I=1,KROW
      TNEW=CHART(JNEWT,I)
      TMIN=CHART(JMINT,I)
      TMINAB=ABS(TMIN)
      IF(KK.EQ.0.AND.TNEW.EQ.TMINAB) GO TO 300
      IF(KK.EQ.1.AND.TNEW.GT.TMINAB) GO TO 300
```

```
C
      CHART(JNEWT,I)=TNEW
C
  100 CONTINUE
C
      DWST=DW
C NOW, REDESIGN MASS BALANCE VARIABLES-IF ANY.
C
      IF(NMBAL.EQ.0) GO TO 140
      DO 130 I=1,NMBAL
      BOT=DBAL*VMBOLD(I)
      IF(DRVMB(I).LT.0.) GO TO 110
      VMBNEW(I)=VMBOLD(I)*SQRT(DRVMB(I)/EMU)
      IF(VMBNEW(I).LT.BOT) GO TO 110
      GO TO 120
  110 VMBNEW(I)=BOT
  120 CONTINUE
C
      DWEL=VMBNEW(I)-VMBOLD(I)
      DW=DW+DWEL
      DVLIN=DVLIN+(DRVMB(I)*DWEL)
  130 CONTINUE
C
C
  140 CONTINUE
C
      DWMB=DW-DWST
C
      LEFT=LINES-KOUNT
      IF(LEFT.LT.2) KOUNT=LINES
      CALL TITLES(2)
      IF(KOUNT.GT.KOUNTH) GO TO 142
      WRITE(IUPR,9000) NREDES
      KOUNT=KOUNT+3
      WRITE(IUPR,9002)
      KOUNT=KOUNT+6
  142 CONTINUE
      WRITE(IUPR,9003) KOWNT,EMU,DVLIN,DW
      KOUNT=KOUNT+2
C
C COMPARE COMPUTED STEP SIZE (DVLIN) WITH DESIRED STEP SIZE (DVDES).
C IF THE DEL OR EPS2 TEST IS SATISFIED, ACCEPT THE NEW DESIGN AND WRITE
C OUT THE NEW DESIGN ARRAY. OTHERWISE, ADJUST THE TARGET DERIVATIVE(EMU)
C AND REPEAT THE REDESIGN PROCEDURE.
C
      IF(DVLIN.GE.VBOT.AND.DVLIN.LE.VTOP) GO TO 200
      IF(DVLIN.EQ.DVOLD) GO TO 200
      DVOLD=DVLIN
C
C THE COMPUTED STEP SIZE IS NOT ACCEPTABLE. ADJUST TARGET DERIVATIVE.
C
      KNEW=-1
      IF(DVLIN.GT.DVDES) KNEW=1
C
      IF(KNEW.EQ.KOLD) GO TO 150
C
      A=0.1*A
```

```
      IF(VTOP.LT.TOP2) VTOP=TOP2                                    FLTDES   116
      IF(VBOT.GT.BOT2) VBOT=BOT2                                    FLTDES   117
C                                                                   FLTDES   118
      NREDES=NCYC+1                                                 FLTDES   119
      KOUNT=LINES                                                   FLTDES   120
      CALL TITLES(2)                                                FLTDES   121
      WRITE(IUPR,9000) NREDES                                       FLTDES   122
      KOUNT=KOUNT+3                                                 FLTDES   123
C                                                                   FLTDES   124
      WRITE(IUPR,9001) DVDES,VBOT,VTOP                              FLTDES   125
      KOUNT=KOUNT+6                                                 FLTDES   126
C                                                                   FLTDES   127
C INITIALIZE KOLD, A AND KOUNT.                                     FLTDES   128
C                                                                   FLTDES   129
      KOLD=0                                                        FLTDES   130
      A=1.0                                                         FLTDES   131
      KOWNT=0                                                       FLTDES   132
C                                                                   FLTDES   133
      DVOLD=100000.                                                 FLTDES   134
C                                                                   FLTDES   135
      WRITE(IUPR,9002)                                              FLTDES   136
      KOUNT=KOUNT+6                                                 FLTDES   137
   50 CONTINUE                                                      FLTDES   138
C                                                                   FLTDES   139
C REDESIGN THE STRUCTURE USING THE LATEST TARGET DERIVATIVE.        FLTDES   140
C                                                                   FLTDES   141
      KOWNT=KOWNT+1                                                 FLTDES   142
      DW=0.0                                                        FLTDES   143
      DVLIN=0.0                                                     FLTDES   144
C                                                                   FLTDES   145
      DO 100 I=1,KROW                                               FLTDES   146
C                                                                   FLTDES   147
      WPUT=CHART(JWPUT,I)                                           FLTDES   148
      TOLD=CHART(JOLDT,I)                                           FLTDES   149
      TMIN=CHART(JMINT,I)                                           FLTDES   150
      TMAX=CHART(JMAXT,I)                                           FLTDES   151
      VDV=CHART(JDRV,I)                                             FLTDES   152
C                                                                   FLTDES   153
      BOT=D*TOLD                                                    FLTDES   154
C                                                                   FLTDES   155
      IF(VDV.LT.O.) GO TO 60                                        FLTDES   156
C                                                                   FLTDES   157
      TNEW=TOLD*SQRT(VDV/EMU)                                       FLTDES   158
      IF(TNEW.LT.BOT) GO TO 60                                      FLTDES   159
      GO TO 70                                                      FLTDES   160
C                                                                   FLTDES   161
   60 TNEW=BOT                                                      FLTDES   162
C                                                                   FLTDES   163
   70 TMINAB=ABS(TMIN)                                              FLTDES   164
      IF(TNEW.LT.TMINAB) TNEW=TMINAB                                FLTDES   165
      IF(TMAX.EQ.0.0) GO TO 80                                      FLTDES   166
      IF(TNEW.GT.TMAX) TNEW=TMAX                                    FLTDES   167
   80 CONTINUE                                                      FLTDES   168
C                                                                   FLTDES   169
      DWEL=WPUT*(TNEW-TOLD)                                         FLTDES   170
      DW=DW+DWEL                                                    FLTDES   171
      DVLIN=DVLIN+(VDV*DWEL)                                        FLTDES   172
```

```
      IFDESN=IFDUM2-IFDESN                                         FLTDES   59
      IFDESO=IFDUM2-IFDESO                                         FLTDES   60
C                                                                  FLTDES   61
      CALL GEDLAB(8HFLTDESO1,IUDESO,NAME,IFDESO,KROW,KCOL)         FLTDES   62
C                                                                  FLTDES   63
      IF (KROW .NE. O) GOTO 5                                      FLTDES   64
      CALL PUDLAB (8HFLTDES83,IUDESN,NAME,IFDESN,KROW,KCOL)        FLTDES   65
      CALL DCLOSE(IUDESN)                                          FLTDES   66
      CALL DCLOSE(IUDESO)                                          FLTDES   67
      GOTO 9999                                                    FLTDES   68
C                                                                  FLTDES   69
    5 CONTINUE                                                     FLTDES   70
      EMU=0.0                                                      FLTDES   71
      J=0                                                          FLTDES   72
C                                                                  FLTDES   73
      DO 10 I=1,KROW                                               FLTDES   74
      CALL GETROW(IUDESO,1,CHART(1,I),KCOL)                        FLTDES   75
      CHART(JOLDT,I)=CHART(JNEWT,I)                                FLTDES   76
      VDV=CHART(JDRV,I)                                            FLTDES   77
      IF(VDV.LE.0.) GO TO 10                                       FLTDES   78
      EMU=EMU+VDV                                                  FLTDES   79
      J=J+1                                                        FLTDES   80
   10 CONTINUE                                                     FLTDES   81
C                                                                  FLTDES   82
      CALL DCLOSE(IUDESO)                                          FLTDES   83
C                                                                  FLTDES   84
      IF(NMBAL.EQ.0) GO TO 18                                      FLTDES   85
      DO 15 I=1,NMBAL                                              FLTDES   86
      VMBOLD(I)=VMBNEW(I)                                          FLTDES   87
      IF(DRVMB(I).LE.0.) GO TO 15                                  FLTDES   88
      EMU=EMU+DRVMB(I)                                             FLTDES   89
      J=J+1                                                        FLTDES   90
   15 CONTINUE                                                     FLTDES   91
C                                                                  FLTDES   92
   18 CONTINUE                                                     FLTDES   93
      IF(J.EQ.0) GO TO 19                                          FLTDES   94
      EMU=0.8*(EMU/J)                                              FLTDES   95
   19 CONTINUE                                                     FLTDES   96
C                                                                  FLTDES   97
C                                                                  FLTDES   98
C DETERMINE THE DESIRED FLUTTER VELOCITY STEP SIZE, DVDES.         FLTDES   99
C                                                                  FLTDES  100
      IF(NNN.EQ.1) GO TO 20                                        FLTDES  101
C                                                                  FLTDES  102
      DVDES=(VDES-VF)/NNN                                          FLTDES  103
      NNN=NNN-1                                                    FLTDES  104
      GO TO 30                                                     FLTDES  105
C                                                                  FLTDES  106
   20 DVDES=VDES*(1.0+(EPS1/2.0))-VF                               FLTDES  107
C                                                                  FLTDES  108
   30 CONTINUE                                                     FLTDES  109
C                                                                  FLTDES  110
      VTOP=DVDES+DEL                                               FLTDES  111
      VBOT=DVDES-DEL                                               FLTDES  112
      WID2=EPS2*ABS(DVDES)                                         FLTDES  113
      TOP2=DVDES+WID2                                              FLTDES  114
      BOT2=DVDES-WID2                                              FLTDES  115
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```
      SUBROUTINE FLTDES(CHART,JCHART,KVAR)                                  FLTDES     2
C                                                                           FLTDES     3
C                                                                           FLTDES     4
      COMPLEX UMOD,VMOD                                                     FLTDES     5
C                                                                           FLTDES     6
      DIMENSION CHART(KVAR,1),JCHART(KVAR,1),NAME(2)                        FLTDES     7
      DIMENSION IPOS(20)                                                    FLTDES     8
      DIMENSION NOTE(2,5)                                                   FLTDES     9
C                                                                           FLTDES    10
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4,     FLTDES    11
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,             FLTDES    12
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,           FLTDES    13
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                       FLTDES    14
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,             FLTDES    15
     5               IUDESI,IFDESI,IUWTI,IFWTI,                             FLTDES    16
     6               IUMEMO,IFMEMO,IUBT,IFBT,                               FLTDES    17
     7               IUDESN,IFDESN,IUMD,IFMD,                               FLTDES    18
     8               IUMEMF,IFMEMF,                                         FLTDES    19
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,     FLTDES    20
     A               IUDESF,IFDESF,IUWT,IFWT,                               FLTDES    21
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,             FLTDES    22
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,         FLTDES    23
     D               IUBR,IFBR,                                             FLTDES    24
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                           FLTDES    25
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,           FLTDES    26
     G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK                  FLTDES    27
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPASS,IDNOPT,      FLTDES    28
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND,    FLTDES    29
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                              FLTDES    30
      COMMON/BAL/ NMBAL,IDBAL(20),VMBIN(20),VMBOLD(20),VMBNEW(20),          FLTDES    31
     1            MBDOF(20,3),DRVMB(20),DRVMBO(20),                         FLTDES    32
     2            S1MB(20),S2MB(20),S3MB(20)                                FLTDES    33
      COMMON/COLS/ IT,IMINT,IMAXT,IDENS,IOLDT,IOLDW,ISRAT,IMINTO,           FLTDES    34
     A             IINITT,IWPUT,                                            FLTDES    35
     1             NVAR,JWPUT,JINITT,JMINT,JMAXT,JOLDT,JNEWT,JDRV,          FLTDES    36
     2             JDRVO,JSPR1,JSPR2,JSPR3                                  FLTDES    37
      C  MON /FILE  / IPOS                                                  FLTDES    38
      C  MON /FLUT/ UMOD(40),VMOD(40),VF,WW,CSCL,NMODE,IDMODE(40)           FLTDES    39
      COMMON/WAYTS/ WINITT,WST,WMB,WBOTH,WPRES,DW                           FLTDES    40
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE          FLTDES    41
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                          FLTDES    42
C                                                                           FLTDES    43
      DATA NOTE/4H    ,4H    ,4HMAX ,4HCUT ,4HMAX ,4HGAGE,4HMIN ,4HGAGE,    FLTDES    44
     14HSTRE,4HSS  /                                                        FLTDES    45
C                                                                           FLTDES    46
      CALL PROGNA(4H(FLT,4HDES))                                            FLTDES    47
      CALL MESAGE(1,6,6HFLTDES)                                             FLTDES    48
      CALL TIMEB(11,11HFROM FLTDES)                                         FLTDES    49
C                                                                           FLTDES    50
C                                                                           FLTDES    51
C 1. READ ENTIRE DESIGN ARRAY INTO CORE.                                    FLTDES    52
C 2. SET OLD GAGE (ROW JOLDT) EQUAL TO NEW GAGE (ROW JNEWT)                 FLTDES    53
C    FOR MASS BALANCE, SET OLD WEIGHT EQUAL TO NEW WEIGHT.                  FLTDES    54
C 3. COMPUTE THE INITIAL TARGET DERIVATIVE.                                 FLTDES    55
C                                                                           FLTDES    56
      IUDESN=IUDUM2-IUDESN                                                  FLTDES    57
      IUDESO=IUDUM2-IUDESO                                                  FLTDES    58
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```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       STRCLU        10                   0 ICYCLE (1)              1 ISTEP  (1)              2 M1     (1)
                                          3 M2     (1)              4 M3     (1)              5 M4     (1)
                                          6 VS     (1)              7 VOLD   (1)              8 VNEW   (1)
                                          9 STPOLD (1)
       COMRWP         3                   0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CTAPES        50                   0 ITAPES (50)
       FLUT         204                   0 UMOD   (80)            80 VMOD   (80)           160 VF     (1)
                                        161 WW     (1)            162 CSCL   (1)            163 NMODE  (1)
                                        164 IDMODE (40)
       LOCSTR         6                   0 IUSTRI (1)              1 IFSTRI (1)              2 IUMREF (1)
                                          3 IFMREF (1)              4 IUMOD  (1)              5 IFMOD  (1)

STATISTICS
  PROGRAM LENGTH                  10235B      4253
  CM LABELED COMMON LENGTH         1543B       867
          52000B CM USED
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LOOPS LABEL   INDEX   FROM-TO    LENGTH   PROPERTIES
  263  120    K       162  165     6B      INSTACK
  277  130    J       166  169     6B      INSTACK
  331  200    I       179  410   663B               EXT REFS  NOT INNER
  332   10    J       183  186    13B               NOT INNER
  337   10    K       184  186     2B      INSTACK
  355   20    J       193  195     3B      INSTACK
  400   30    J       222  225    15B               NOT INNER
  407   30    K       223  225     3B      INSTACK
  417   40    J       230  237    22B               NOT INNER
  433   35    L       234  236     2B      INSTACK
  443   45    L       240  247    24B               NOT INNER
  461   44    J       244  246     2B      INSTACK
  502   50    J       256  260    11B         OPT
  516   60    J       265  268    27B               NOT INNER
  531   60    K       266  268    11B         OPT
  534   70    J       278  288    21B         OPT
  613   75    J       297  301    17B               NOT INNER
  614   75    K       298  301    14B               NOT INNER
  622   75    L       299  301     2B      INSTACK
  654   76    J       331  335    23B               NOT INNER
  655   76    K       332  335    20B               NOT INNER
  666   76    L       333  335     3B      INSTACK
  700   77    L       339  356    54B               NOT INNER
  702   78    J       341  347    23B               NOT INNER
  717   72    M       344  346     2B      INSTACK
  727   74    J       349  355    23B               NOT INNER
  744   79    M       352  354     2B      INSTACK
  755   81    II      360  371    47B               NOT INNER
  762   82    J       364  367    30B               NOT INNER
  776   82    K       365  367    11B         OPT
 1050   80    J       379  385    26B               EXT REFS
 1077   83    J       387  390    14B               EXT REFS
 1114   84    J       391  393    12B               EXT REFS
 1127   90    II      394  399    30B               EXT REFS  NOT INNER
 1134   90    J       397  399    21B               EXT REFS  NOT INNER
 1137         K       398  398    12B               EXT REFS
 1162         J       400  400    10B               EXT REFS
 1176         J       401  401    10B               EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       KLUFF         1             0 KFREE  (1)
       CLIST        11             0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                                   3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                                   6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                   9 KOUNTH (1)         10 KOUNTI (1)
       STORES      457             0 NUMSTR (1)          1 KCONST (1)          2 ISTDOF (30)
                                  32 IDYDOF (30)        62 IDSTR  (5)         67 STRWI  (5)
                                  72 STRWO  (5)         77 STRWN  (5)         82 STRII  (15)
                                  97 STRIO  (15)       112 STRIN  (15)       127 STRRI  (15)
                                 142 STRRO  (15)       157 STRRN  (15)       172 STRWDO (5)
                                 177 STRWDN (5)        182 STRIDO (15)       197 STRIDN (15)
                                 212 STRRDO (15)       227 STRRDN (15)       242 SCALE  (65)
                                 307 STRFI  (30)       337 STRFO  (30)       367 STRFN  (30)
                                 397 STRFDO (30)       427 STRFDN (30)
       INVERT      125             0 INVERT (1)          1 IUA2   (1)          2 IFLEX  (1)
                                   3 AORD   (30)        33 IPERM  (30)        63 NSTOR  (60)
                                 123 IPREV  (1)        124 NDOFT  (1)
```

```
VARIABLES      SN  TYPE          RELOCATION
 1625  N2          INTEGER                          REFS        323        355        364        380   DEFINED        277        323
                                                     355
 1626  N3          INTEGER                          REFS        324        364        380   DEFINED        278        324
 1623  SMDVEL      REAL                             REFS        296        350        365        381   DEFINED        275        296
                                                     350
 1622  SMDWEL      REAL                             REFS        295        349        365        381   DEFINED        274        295
                                                     349
  265  S1MB        REAL        ARRAY   BAL          REFS         30
  311  S2MB        REAL        ARRAY   BAL          REFS         30
  335  S3MB        REAL        ARRAY   BAL          REFS         30
 1630  TINITT      REAL                             REFS        293    DEFINED        289
 1606  TMAX        REAL                             REFS        165      2*166        302   DEFINED        [illegible]        301
 1605  TMIN        REAL                             REFS        163        283        305   DEFINED        149        282
 1611  TMINAB      REAL                             REFS      2*164        284        285        305   DEFINED        163        283
 1610  TNEW        REAL                             REFS        158        164        166        169        173        284        285
                                                     292        293        300        302        318   DEFINED        157        161
                                                     164        166        281
 1604  TOLD        REAL                             REFS        153        157        169        292        299        318
                                                  DEFINED       148        290
 1573  TOP2        REAL                             REFS      2*115    DEFINED        113
    0  UMOD        COMPLEX     ARRAY   FLUT         REFS          4         38
 1571  VBOT        REAL                             REFS        116        124        217   DEFINED        111        116
   10  VDES        REAL                KLUES        REFS         27        102        106
 1566  VDV         REAL                             REFS         7[illegible]         78        155        157        171
                                                  DEFINED        76        151
  240  VF          REAL                FLUT         REFS         38        102        106
   25  VMBIN       REAL        ARRAY   BAL          REFS         30        347
   75  VMBNEW      REAL        ARRAY   BAL          REFS         30         86        185        190        346        347        353
                                                     357    DEFINED        184        187
   51  VMBOLD      REAL        ARRAY   BAL          REFS         30        182        184        190        346        352        357
                                                  DEFINED        86
  120  VMOD        COMPLEX     ARRAY   FLUT         REFS          4         38
 1570  VTOP        REAL                             REFS        115        124        217   DEFINED        110        115
    3  WBOTH       REAL                WAYTS        REFS         39        261        262        268   DEFINED        260
 1572  WID2        REAL                             REFS        113        114    DEFINED        112
    0  WINITT      REAL                WAYTS        REFS         39        261        262        268
    2  WMB         REAL                WAYTS        REFS         39        259        260        268   DEFINED        259
 1620  WPCT        REAL                             REFS        268    DEFINED        262
    4  WPRES       REAL                WAYTS        REFS         39        268    DEFINED        261
 1603  WPUT        REAL                             REFS        169        292        293   DEFINED        147        288
    1  WST         REAL                WAYTS        REFS         39        258        260        268   DEFINED        258
  241  WW          REAL                FLUT         REFS         38
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS           REFERENCES
       DCLOSE                  1                65         66         82        256
       GEDLAB                  6                61
       GETROW                  4                74
       MESAGE                  3                47        386
       PROGNA                  2                46
       PUDLAB                  6                64        251
       PUTROW                  4               254
       SQRT          REAL      1  LIBRARY      157        184
       TIMEB                   2                48        385
       TITLES                  1               120        202        239        265        308        333        373
```

```
INLINE FUNCTIONS    TYPE     ARGS          DEF LINE  REFERENCES
       ABS          REAL        1  INTRIN                 112       163       283

STATEMENT LABELS                     DEF LINE    REFERENCES
   36   5                              69          63
   60   10                             80          73        77
   76   15                             90          85        87
  100   18                             92          84
  104   19                             95          93
  112   20                            106         100
  117   30                            108         104
  156   50                            137         233
  206   60                            161         155       158
  210   70                            163         159
  217   80                            167         165
    0   100                           175         145
  247   110                           187         183       185
  251   120                           188         186
    0   130                           193         181
  261   140                           196         180
  302   142                           208         203
  323   150                           231         226
  330   200                           236         217       218
  344   210                           243         240
    0   250                           254         253
  412   270                           273         368
  473   280                           304         297
  477   290                           307         303
  522   292                           317         309
  547   300                           325         280       284       285
  575   310                           339         334
  626   350                           356         353
    0   360                           360         344
  646   400                           362         329
  655   500                           370         327
  674   510                           379         374
 1200   9000      FMT                 389         121       204       241       266       310       335       375
 1205   9001      FMT                 390         124
 1227   9002      FMT                 395         135       206
 1255   9003      FMT                 401         209
 1260   9004      FMT                 402         244
 1272   9005      FMT                 404         245
 1312   9006      FMT                 407         268
 1405   9007      FMT                 418         312       337
 1416   9008      FMT                 420         313       377
 1427   9009      FMT                 422         315
 1445   9010      FMT                 425         318       357
 1451   9011      FMT                 426         340
 1457   9012      FMT                 427         342
 1475   9013      FMT                 430         364
 1513   9014      FMT                 433         380
 1530   9015      FMT                 436         365       381
  702   9999                          384          67

LOOPS   LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   41   10          I          73 80        22B                EXT REFS
   70   15          I          85 90         7B        INSTACK
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
  162  100      I          145 175       51B               EXT REFS
  236  130      I          181 193       23B               EXT REFS
  360  250      I          253 254        7B               EXT REFS
  416  300      I          280 325      134B               EXT REFS
  605  360      I          344 360       41B               EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       PLACES       98              0 IUIN1  (1)              1 IUIN2  (1)              2 IUOUT1 (1)
                                    3 IUOUT2 (1)              4 IUGO1  (1)              5 IUGO2  (1)
                                    6 IUGO3  (1)              7 IUGO4  (1)              8 IUSCR  (1)
                                    9 IFSCR  (1)             10 IFS1   (1)             11 IFS2   (1)
                                   12 IFS3   (1)             13 IFS4   (1)             14 IUCD   (1)
                                   15 IUPR   (1)             16 IUA    (1)             17 IFA    (1)
                                   18 IUY    (1)             19 IFY    (1)             20 IUMEMN (1)
                                   21 IFMEMN (1)             22 IUSTFN (1)             23 IFSTFN (1)
                                   24 IUKS   (1)             25 IFKS   (1)             26 IUB    (1)
                                   27 IFB    (1)             28 IUDESO (1)             29 IFDESO (1)
                                   30 IUMDBI (1)             31 IFMDBI (1)             32 IUADDI (1)
                                   33 IFADDI (1)             34 IUBALI (1)             35 IFBALI (1)
                                   36 IUDESI (1)             37 IFDESI (1)             38 IUWTI  (1)
                                   39 IFWTI  (1)             40 IUMEMO (1)             41 IFMEMO (1)
                                   42 IUBT   (1)             43 IFBT   (1)             44 IUDESN (1)
                                   45 IFDESN (1)             46 IUMD   (1)             47 IFMD   (1)
                                   48 IUMEMF (1)             49 IFMEMF (1)             50 IUSTFO (1)
                                   51 IFSTFO (1)             52 IUMDB  (1)             53 IFMDB  (1)
                                   54 IUADD  (1)             55 IFADD  (1)             56 IUBAL  (1)
                                   57 IFBAL  (1)             58 IUDESF (1)             59 IFDESF (1)
                                   60 IUWT   (1)             61 IFWT   (1)             62 IUDUM1 (1)
                                   63 IFDUM1 (1)             64 IUDUM2 (1)             65 IFDUM2 (1)
                                   66 IUDUM3 (1)             67 IFDUM3 (1)             68 IUL    (1)
                                   69 IFL    (1)             70 IUYT   (1)             71 IFYT   (1)
                                   72 IUZ    (1)             73 IFZ    (1)             74 IUZR   (1)
                                   75 IFZR   (1)             76 IULR   (1)             77 IFLR   (1)
                                   78 IUBR   (1)             79 IFBR   (1)             80 IUPHTF (1)
                                   81 IFPHTF (1)             82 IUMODM (1)             83 IFMODM (1)
                                   84 IUMODK (1)             85 IFMODK (1)             86 IUPHT  (1)
                                   87 IFPHT  (1)             88 IUQT   (1)             89 IFQT   (1)
                                   90 IUQ    (1)             91 IFQ    (1)             92 IUPH   (1)
                                   93 IFPH   (1)             94 IUINCM (1)             95 IFINCM (1)
                                   96 IUINCK (1)             97 IFINCK (1)
       KLUES        24              0 KLUSE  (1)              1 KLUNAL (1)              2 IRED   (1)
                                    3 KLUMD  (1)              4 KLUBAL (1)              5 MSADD  (1)
                                    6 NPASS  (1)              7 IDNOPT (1)              8 VDES   (1)
                                    9 EPS1   (1)             10 DWMAX  (1)             11 NBAR   (1)
                                   12 NFIX   (1)             13 D      (1)             14 DEL    (1)
                                   15 EPS2   (1)             16 NCYC   (1)             17 NNN    (1)
                                   18 IBAND  (1)             19 IFIN   (1)             20 KLUB   (1)
                                   21 KLUQ   (1)             22 MORBAL (1)             23 DBAL   (1)
       BAL         241              0 NMBAL  (1)              1 IDBAL  (20)            21 VMBIN  (20)
                                   41 VMBOLD (20)            61 VMBNEW (20)            81 MBDOF  (60)
                                  141 DRVMB  (20)           161 DRVMBO (20)           181 S1MB   (20)
                                  201 S2MB   (20)           221 S3MB   (20)
       COLS         22              0 IT     (1)              1 IMINT  (1)              2 IMAXT  (1)
                                    3 IDENS  (1)              4 IOLDT  (1)              5 IOLDW  (1)
                                    6 ISRAT  (1)              7 IMINTO (1)              8 IINITT (1)
                                    9 IWPUT  (1)             10 NVAR   (1)             11 JWPUT  (1)
                                   12 JINITT (1)             13 JMINT  (1)             14 JMAXT  (1)
```

```
COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
                                     15 JOLDT  (1)            16 JNEWT  (1)            17 JDRV   (1)
                                     18 JDRVO  (1)            19 JSPR1  (1)            20 JSPR2  (1)
                                     21 JSPR3  (1)
      FILE          20                0 IPOS   (20)
      FLUT         204                0 UMOD   (80)           80 VMOD   (80)          160 VF     (1)
                                    161 WW     (1)           162 CSCL   (1)           163 NMODE  (1)
                                    164 IDMODE (40)
      WAYTS          6                0 WINITT (1)             1 WST    (1)             2 WMB    (1)
                                      3 WBOTH  (1)             4 WPRES  (1)             5 DW     (1)
      CLIST         11                0 KOUNT  (1)             1 KPAGE  (1)             2 LINES  (1)
                                      3 LINEST (1)             4 KLABEL (1)             5 KTPAGE (1)
                                      6 NPAGE  (1)             7 KBPAGE (1)             8 LINESG (1)
                                      9 KOUNTH (1)            10 KOUNTI (1)

STATISTICS
  PROGRAM LENGTH                 1722B     978
  CM LABELED COMMON LENGTH       1162B     626
        52000B CM USED
```

```
C45700, SUB. PACK (PACK ROWS OF MATRICES BY ELIMINATING THE ZEROES)     PACK       2
C                                                                       PACK       3
C********************************************************************** PACK       4
C                                                                     * PACK       5
C***  SUBROUTINE PACK   (IFIRST,ICOUNT,IOUTPT,IOUTCT,IWORD) *********** PACK       6
C                                                                     * PACK       7
C***  OBJECTIVE  ****************************************************** PACK       8
C     ---------                                                       * PACK       9
C     USED TO PACK ROWS OF A MATRIX SO THEY MAY BE WRITTEN ON A DATA  * PACK      10
C     SET IN AN EFFICIENT MANNER   THIS IS DONE BY REPRESENTING       * PACK      11
C     STRINGS OF ZEROES BY A SINGLE FIXED POINT NEGATIVE INTEGER WHERE * PACK     12
C     THE VALUE OF THE INTEGER REPRESENTS THE NUMBER OF ZEROES IN THE * PACK      13
C     STRING.  NON-ZERO NUMBERS ARE PRECEEDED BY A FIXED POINT NUMBER * PACK      14
C     INDICATING THE NUMBER OF NON-ZERO NUMBERS THAT FOLLOW.  A SINGLE * PACK     15
C     ZERO IN A STRING IS REPRESENTED EXPLICITLY                      * PACK      16
C     FOR EXAMPLE GIVE THE FOLLOWING ROW OF A MATRIX.                 * PACK      17
C         0., 0., 1., 2., 0., 5., 7., 0., 0., 0., 0., 0., 0.,         * PACK      18
C     IT WOULD BE PACKED TO BECOME                                    * PACK      19
C        -2, 5, 1., 2., 0., 5., 7., -6                                * PACK      20
C                                                                     * PACK      21
C     THE SUBROUTINE MAY BE USED IN ONE OF TWO WAYS                   * PACK      22
C                                                                     * PACK      23
C     USAGE 1.                                                        * PACK      24
C                                                                     * PACK      25
C     CALL PACK (VAR(2), IMAX, VAR(2), IOUT, VAR(1))                  * PACK      26
C                                                                     * PACK      27
C     IN THE ABOVE EXAMPLE THE VARIABLE VAR(I) IS DIMENSIONED FOR ONE * PACK      28
C     MORE (IMAX+1) THAN THE NUMBER OF VALUES (IMAX).  THE ARRAY      * PACK      29
C     WHICH IS TO BE PACKED MUST BE LOCATED IN VAR(I+1), I=1,...,IMAX. * PACK     30
C     THE RESULT WILL BE THE PACKED ARRAY CONSISTING OF IOUT ELEMENTS, * PACK     31
C     (VAR(I), I=1,...,IOUT).                                         * PACK      32
C                                                                     * PACK      33
C     USAGE 2.                                                        * PACK      34
C                                                                     * PACK      35
C     EQUIVALENCE (VAR(1), VARP(2)), (WORD, VARP(1))                  * PACK      36
C                                                                     * PACK      37
C     CALL PACK (VAR, IMAX, VAR, IOUT, WORD)                          * PACK      38
C                                                                     * PACK      39
C     IN THE ABOVE EXAMPLE THE VARIABLE VAR(I) IS DIMENSIONED FOR THE * PACK      40
C     NUMBER OF VALUES (IMAX) WHEREAS THE VARIABLE VARP(I) IS         * PACK      41
C     DIMENSIONED FOR ONE MORE (IMAX+1) THAN THE NUMBER OF VALUES     * PACK      42
C     (IMAX).  THE ARRAY WHICH IS TO BE PACKED MUST BE LOCATED IN     * PACK      43
C     VAR(I), I=1,...,IMAX.  THE RESULT WILL BE THE PACKED ARRAY      * PACK      44
C     CONSISTING OF IOUT ELEMENTS, (VARP(I), I=1,...,IOUT).           * PACK      45
C                                                                     * PACK      46
C***  INPUT/OUTPUT  *************************************************** PACK      47
C     ------------                                                    * PACK      48
C     THE SUBROUTINE RECEIVES A ROW OF A MATRIX AND RETURNS TO THE    * PACK      49
C     CALLING ROUTINE A PACKED ROW.                                   * PACK      50
C                                                                     * PACK      51
C***  SUMMARY OF SYMBOLS  ********************************************* PACK      52
C     ------------------                                              * PACK      53
C                                                                     * PACK      54
C.... ICOUNT ....... INPUT                                            * PACK      55
C     NUMBER OF ELEMENTS IN THE ROW TO BE PACKED.  IN THE EXAMPLE THIS * PACK     56
C     WOULD BE 13.                                                    * PACK      57
C                                                                     * PACK      58
```

```
C.... IFIRST(I) .... INPUT                                              * PACK    59
C     ROW OF THE MATRIX WHICH IS TO BE PACKED.                          * PACK    60
C     NOTE THAT THIS VARIABLE IN THE CALLING PROGRAM MUST BE            * PACK    61
C     DIMENSIONED FOR ONE MORE THAN THE NUMBER OF VALUES IN THE ARRAY   * PACK    62
C     IF THE SUBROUTINE IS CALLED ACCORDING TO USAGE 1, SHOWN ABOVE.    * PACK    63
C                                                                       * PACK    64
C.... IOUTCT ....... OUTPUT                                             * PACK    65
C     NUMBER OF ELEMENTS IN THE PACKED ARRAY MINUS ONE (THE FIRST WORD  * PACK    66
C     IS NOT INCLUDED IN THE COUNT) RETURNED TO THE CALLING PROGRAM.    * PACK    67
C     IN THE EXAMPLE THIS WOULD BE SEVEN BECAUSE THE FIRST WORD IS      * PACK    68
C     NOT INCLUDED IN THE COUNT.  THE USER MUST INCREMENT THIS          * PACK    69
C     VARIABLE BY ONE, IN THE CALLING PROGRAM, IN ORDER TO HAVE THE     * PACK    70
C     PROPER COUNT FOR THE NUMBER OF ELEMENTS IN THE PACKED ARRAY.      * PACK    71
C                                                                       * PACK    72
C.... IOUTPT(I)..... OUTPUT                                             * PACK    73
C     PACKED ROW RETURNED TO CALLING PROGRAM.                           * PACK    74
C                                                                       * PACK    75
C.... IWORD  ....... OUTPUT                                             * PACK    76
C     VALUE OF FIRST WORD IN PACKED ROW.  IN THE EXAMPLE THIS WOULD     * PACK    77
C     BE -2.                                                              PACK    78
C                                                                       * PACK    79
C.... JINT ......... INTERMEDIATE                                       * PACK    80
C     COUNTING INDEX FOR THE NUMBER OF ZERO VALUES EXISTING WITHIN      * PACK    81
C     THE  NON-ZERO VALUES IN THE ROW WHICH IS TO BE PACKED.            * PACK    82
C                                                                       * PACK    83
C.... JOUT ......... INTERMEDIATE                                       * PACK    84
C     LOCATION IN THE OUTPUT VARIABLE IOUTPT(JOUT) OF THE NUMBER OF     * PACK    85
C     NON-ZERO VALUES REPRESENTED BY JREAL, IOUTPT(JOUT) = JREAL.       * PACK    86
C                                                                       * PACK    87
C     JREAL ........ INTERMEDIATE                                       * PACK    88
C     COUNTING INDEX FOR THE NUMBER OF NON-ZERO VALUES EXISTING         * PACK    89
C     WITHIN THE ZERO VALUES IN THE ROW WHICH IS TO BE PACKED.          * PACK    90
C                                                                       * PACK    91
C***  ERROR MESSAGES  *************************************************** PACK    92
C     --------------                                                    * PACK    93
C     NONE.                                                             * PACK    94
C                                                                       * PACK    95
C************************************************************************ PACK    96
C                                                                         PACK    97
      SUBROUTINE PACK (IFIRST,ICOUNT,IOUTPT,IOUTCT,IWORD)                 PACK    98
C                                                                         PACK    99
      DIMENSION IFIRST(ICOUNT),IOUTPT(ICOUNT)                             PACK   100
C                                                                         PACK   101
C                                                                         PACK   102
C INITIALIZE THE VARIABLES                                                PACK   103
C                                                                         PACK   104
      JREAL=0                                                             PACK   105
      JINT=0                                                              PACK   106
      IOUTCT=-1                                                           PACK   107
      JOUT=0                                                              PACK   108
C                                                                         PACK   109
C                                                                         PACK   110
C PACK THE ARRAY AND DEFINE APPROPRIATE INDICES                           PACK   111
C                                                                         PACK   112
      DO 45 I=1,ICOUNT                                                    PACK   113
      IF (IFIRST(I)) 10,30,10                                             PACK   114
   10 IF (JREAL.LE.0) IOUTCT=IOUTCT+1                                     PACK   115
```

```
   13 JREAL=JREAL+1                                          PACK     116
      IF (JINT-1) 20,15,22                                   PACK     117
   15 JREAL=JREAL+1                                          PACK     118
      IOUTCT=IOUTCT+1                                        PACK     119
      IOUTPT(IOUTCT)=0                                       PACK     120
      JINT=0                                                 PACK     121
   20 IOUTCT=IOUTCT+1                                        PACK     122
      IOUTPT(IOUTCT)=IFIRST(I)                               PACK     123
      GO TO 45                                               PACK     124
   22 IF (IOUTCT) 24,24,25                                   PACK     125
   24 IWORD=-JINT                                            PACK     126
      GO TO 26                                               PACK     127
   25 IOUTPT(IOUTCT)=-JINT                                   PACK     128
   26 JINT=0                                                 PACK     129
      IOUTCT=IOUTCT+2                                        PACK     130
      JOUT=IOUTCT-1                                          PACK     131
      IOUTPT(IOUTCT)=IFIRST(I)                               PACK     132
      GO TO 45                                               PACK     133
   30 JINT=JINT+1                                            PACK     134
      IF (JREAL.EQ.0) GO TO 45                               PACK     135
   35 IF (JINT.EQ.1) GO TO 45                                PACK     136
      IF (JOUT.GT.0) GO TO 40                                PACK     137
      IWORD=JREAL                                            PACK     138
      GO TO 42                                               PACK     139
   40 IOUTPT(JOUT)=JREAL                                     PACK     140
   42     CONTINUE                                           PACK     141
      JREAL=0                                                PACK     142
   45 CONTINUE                                               PACK     143
C                                                            PACK     144
C INVESTIGATE SPECIAL CASES SUCH AS.                         PACK     145
C      1. LEADING ZEROS                                      PACK     146
C      2. TRAILING ZEROES                                    PACK     147
C      3. ALL ZEROES IN THE ARRAY                            PACK     148
C      4. ALL VALUES IN THE ARRAY                            PACK     149
C                                                            PACK     150
      IF (JINT-1) 52,50,60                                   PACK     151
   50 IF (JREAL.EQ.0) GO TO 70                               PACK     152
      IOUTCT=IOUTCT+1                                        PACK     153
      IOUTPT(IOUTCT)=0                                       PACK     154
      JREAL=JREAL+1                                          PACK     155
   52 IF (JOUT.GT.0) GO TO 55                                PACK     156
      IWORD=JREAL                                            PACK     157
      GO TO 100                                              PACK     158
   55 IOUTPT(JOUT)=JREAL                                     PACK     159
      GO TO 100                                              PACK     160
   60 IOUTCT=IOUTCT+1                                        PACK     161
      IF (IOUTCT.GT.0) GO TO 62                              PACK     162
      IWORD=-JINT                                            PACK     163
      GO TO 100                                              PACK     164
   62     CONTINUE                                           PACK     165
      IOUTPT(IOUTCT)=-JINT                                   PACK     166
      GO TO 100                                              PACK     167
C                                                            PACK     168
C                                                            PACK     169
C ARRAY WHICH IS TO BE PACKED CONSISTS OF ONE ZERO.          PACK     170
C                                                            PACK     171
   70 IWORD=-1                                               PACK     172
```

```
                   IOUTCT=0                                                    PACK       173
             C                                                                 PACK       174
               100 CONTINUE                                                    PACK       175
  175        C                                                                 PACK       176
                   RETURN                                                      PACK       177
                   END                                                         PACK       178


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
   3  PACK          97           176

VARIABLES     SN  TYPE             RELOCATION
  116  I          INTEGER                           REFS       113      122      131   DEFINED      112
    0  ICOUNT     INTEGER                   F.P.    REFS      2*99      112  DEFINED        97
    0  IFIRST     INTEGER    ARRAY          F.P.    REFS        99      113      122       131  DEFINED       97
    0  IOUTCT     INTEGER                   F.P.    REFS       114      118      119       121      122      124      127
                                                     129       130      131      152       153      160      161      165
                                                  DEFINED       97      106      114       118      121      129      152
                                                     160       172
    0  IOUTPT     INTEGER    ARRAY          F.P.    REFS        99  DEFINED       97       119      122      127      131
                                                     139       153      158      165
    0  IWORD      INTEGER                   F.P.  DEFINED       97      125      137       156      162      171
  114  JINT       INTEGER                           REFS       116      125      127       133      135      150      162
                                                     165   DEFINED      105      120       128      133
  115  JOUT       INTEGER                           REFS       136      139      155       158  DEFINED      107      130
  113  JREAL      INTEGER                           REFS       114      115      117       134      137      139      151
                                                     154       156      158  DEFINED       104      115      117      141
                                                     154

STATEMENT LABELS             DEF LINE   REFERENCES
    0  10       INACTIVE       114      2*113
    0  13       INACTIVE       115
    0  15       INACTIVE       117        116
   30  20                      121        116
   32  22                      124        116
    0  24       INACTIVE       125      2*124
   36  25                      127        124
   37  26                      128        126
   44  30                      133        113
    0  35       INACTIVE       135
   53  40                      139        136
   55  42                      140        138
   56  45                      142        112      123      132      134      135
    0  50       INACTIVE       151        150
   70  52                      155        150
   74  55                      158        155
   77  60                      160        150
  104  62                      164        161
  110  70                      171        151
  112  100                     174        157      159      163      166
```

```
LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   20  45       I          112 142       37B       OPT

STATISTICS
  PROGRAM LENGTH                 123B       83
          52000B CM USED
```

```
C45700, SUB. UNPACK (UNPACK ROWS OF MATRICES THAT HAVE BEEN PACKED)      UNPACK     2
C                                                                         UNPACK     3
C************************************************************************ UNPACK     4
C                                                                       * UNPACK     5
C***   SUBROUTINE UNPACK (IFRIST,ICOUNT,IOUTPT,IOUTCT,NLZERS) *********** UNPACK     6
C                                                                       * UNPACK     7
C***   OBJECTIVE  **************************************************** UNPACK     8
C      ---------                                                        * UNPACK     9
C      UNPACKS ROWS OF MATRICES THAT HAVE BEEN PACKED BY SUBROUTINE     * UNPACK    10
C      PACK.                                                            * UNPACK    11
C                                                                       * UNPACK    12
C      THE SUBROUTINE MAY BE USED IN ONE OF TWO WAYS.                   * UNPACK    13
C                                                                       * UNPACK    14
C      USAGE 1.                                                         * UNPACK    15
C                                                                       * UNPACK    16
C      IM =  ((IMAX+1) - IN) + 1                                        * UNPACK    17
C      CALL UNPACK (VAR(IM),IN,VAR,IMAX,NLZERS)                         * UNPACK    18
C                                                                       * UNPACK    19
C      IN THE ABOVE EXAMPLE THE VARIABLE VAR(I) IS DIMENSIONED FOR ONE  * UNPACK    20
C      MORE (IMAX+1) THAN THE NUMBER OF VALUES (IMAX).  THE ARRAY       * UNPACK    21
C      WHICH IS TO BE UNPACKED MUST BE LOCACTED IN V(IM) AS SHOWN BELOW.* UNPACK    22
C                                                                       * UNPACK    23
C      DO XXX J=1,...,IN                                                * UNPACK    24
C      IM      =  (IMAX+1) - J + 1                                      * UNPACK    25
C      JM      =  IN - J + 1                                            * UNPACK    26
C XXX VAR(IM) =  VAR(JM)                                                * UNPACK    27
C      THE RESULT WILL BE THE UNPACKED ARRAY CONSISTING OF IMAX         * UNPACK    28
C      ELEMENTS (VAR(I), I=1,...,IMAX).                                 * UNPACK    29
C                                                                       * UNPACK    30
C      USAGE 2.                                                         * UNPACK    31
C                                                                       * UNPACK    32
C      CALL UNPACK (VAR,IN,VARU,IMAX,NLZERS)                            * UNPACK    33
C                                                                       * UNPACK    34
C      IN THE ABOVE EXAMPLE THE VARIABLE VAR(I) IS DIMENSIONED FOR ONE  * UNPACK    35
C      MORE (IMAX+1) THAN THE NUMBER OF VALUES (IMAX) WHEREAS THE       * UNPACK    36
C      VARIABLE VARU(I) IS DIMENSIONED FOR IMAX.  THE ARRAY WHICH IS TO * UNPACK    37
C      BE UNPACKED MUST BE LOCATED IN VAR(I), I=1,...,IN.               * UNPACK    38
C      THE RESULT WILL BE THE UNPACKED ARRAY CONSISTING OF IMAX         * UNPACK    39
C      ELEMENTS (VARU(I), I=1,...,IMAX).                                * UNPACK    40
C                                                                       * UNPACK    41
C***   INPUT/OUTPUT  ************************************************* UNPACK    42
C      ------------                                                     * UNPACK    43
C      USING A PACKED ROW OF A MATRIX, THE SUBROUTINE GENERATES A ROW   * UNPACK    44
C      OF A MATRIX WITH EXPLICIT ZEROES.                                * UNPACK    45
C                                                                       * UNPACK    46
C***   SUMMARY OF SYMBOLS  ******************************************* UNPACK    47
C      ------------------                                               * UNPACK    48
C.... ICOUNT ....... INPUT                                              * UNPACK    49
C      NUMBER OF ELEMENTS IN THE PACKED ROW.                            * UNPACK    50
C                                                                       * UNPACK    51
C.... IFIRST(I) .... INPUT                                              * UNPACK    52
C      ROW OF THE MATRIX WHICH IS TO BE UNPACKED.                       * UNPACK    53
C      NOTE THAT THIS VARIABLE IN THE CALLING PROGRAM MUST BE           * UNPACK    54
C      DIMENSIONED FOR ONE MORE (IOUTCT+1) THAN THE NUMBER OF VALUES    * UNPACK    55
C      IN THE UNPACKED ARRAY (IOUPT(I)) FOR BOTH USAGES SHOWN ABOVE.    * UNPACK    56
C                                                                       * UNPACK    57
C.... IPT ......... INTERMEDIATE                                        * UNPACK    58
```

```
C     COUNTINT INDEX FOR THE PACKED VARIABLE                         * UNPACK    59
C                                                                    * UNPACK    60
C.... IOUTCT ....... INPUT                                            * UNPACK    61
C     NUMBER OF ELEMENTS IN THE UNPACKED ROW.                        * UNPACK    62
C                                                                    * UNPACK    63
C.... IOUTPT(I)..... OUTPUT                                           * UNPACK    64
C     UNPACKED ROW OF THE MATRIX RETURNED TO THE CALLING PROGRAM.    * UNPACK    65
C                                                                    * UNPACK    66
C.... JPT ......... INTERMEDIATE                                      * UNPACK    67
C     COUNTING INDEX FOR THE UNPACKED VARIABLE.                      * UNPACK    68
C                                                                    * UNPACK    69
C.... NLZERS ....... OUTPUT                                           * UNPACK    70
C     NUMBER OF LEADING ZEROS IN THE PACKED ROW.                     * UNPACK    71
C                                                                    * UNPACK    72
C***  ERROR MESSAGES  ************************************************ UNPACK    73
C     --------------                                                 * UNPACK    74
C     NONE.                                                          * UNPACK    75
C                                                                    * UNPACK    76
C******************************************************************** UNPACK    77
C                                                                      UNPACK    78
      SUBROUTINE UNPACK (IFIRST,ICOUNT,IOUTPT,IOUTCT,NLZERS)           UNPACK    79
C                                                                      UNPACK    80
      DIMENSION IFIRST(ICOUNT),IOUTPT(IOUTCT)                          UNPACK    81
C                                                                      UNPACK    82
C                                                                      UNPACK    83
C FUNCTION DEFINITION                                                  UNPACK    84
      MINOF(K1,K2) =  MINO(K1,K2)                                      UNPACK    85
C                                                                      UNPACK    86
      KERROR = 1                                                       UNPACK    87
      IF (IFIRST(1)) 7,99,13                                           UNPACK    88
    7 NLZERS=-IFIRST(1)                                                UNPACK    89
      DO 10 I=1,NLZERS                                                 UNPACK    90
   10 IOUTPT(I)=0                                                      UNPACK    91
      JPT=NLZERS+1                                                     UNPACK    92
      IPT=2                                                            UNPACK    93
      IF(JPT-IOUTCT) 19,19,37                                          UNPACK    94
   13 IPT=1                                                            UNPACK    95
      JPT=1                                                            UNPACK    96
      IF (IFIRST(2)) 28,16,28                                          UNPACK    97
   16 NLZERS=1                                                         UNPACK    98
      GO TO 31                                                         UNPACK    99
   19     CONTINUE                                                     UNPACK   100
      IF (IFIRST(IPT)) 22,99,31                                        UNPACK   101
   22 IEND=MINOF(IOUTCT,(JPT-IFIRST(IPT)-1))                           UNPACK   102
      DO 25 I=JPT,IEND                                                 UNPACK   103
   25 IOUTPT(I)=0                                                      UNPACK   104
      JPT=IEND+1                                                       UNPACK   105
      IPT=IPT+1                                                        UNPACK   106
      IF (JPT-IOUTCT) 19,19,37                                         UNPACK   107
   28 NLZERS=0                                                         UNPACK   108
   31 IST=IPT+1                                                        UNPACK   109
      ISTEP=MINOF(IFIRST(IPT),(IOUTCT-JPT+1))                          UNPACK   110
      IEND=IPT+ISTEP                                                   UNPACK   111
      DO 34 I=IST,IEND                                                 UNPACK   112
      IOUTPT(JPT)=IFIRST(I)                                            UNPACK   113
   34 JPT=JPT+1                                                        UNPACK   114
      IPT=IEND+1                                                       UNPACK   115
```

```
  115               IF (JPT-IOUTCT) 19,19,37                                                   UNPACK     116
              C                                                                                UNPACK     117
                 37 GO TO 100                                                                  UNPACK     118
                 99 KERROR = 2                                                                 UNPACK     119
              C                                                                                UNPACK     120
  120              100 CONTINUE                                                                UNPACK     121
              C                                                                                UNPACK     122
                    RETURN                                                                     UNPACK     123
                    END                                                                        UNPACK     124



     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  UNPACK         78          122

VARIABLES      SN  TYPE            RELOCATION
  105  I          INTEGER                          REFS        90       103       112   DEFINED        89       102       111
    0  ICOUNT     INTEGER                 F.P.     REFS        80   DEFINED        78
  110  IEND       INTEGER                          REFS       102       104       111       114   DEFINED       101       110
    0  IFIRST     INTEGER     ARRAY       F.P.     REFS        80        87        88        96       100       101       109
                                                     112   DEFINED        78
    0  IOUTCT     INTEGER                 F.P.     REFS        80        93       101       106       109       115
                                                DEFINED        78
    0  IOUTPT     INTE'ER     ARRAY       F.P.     REFS        80   DEFINED        78        90       103       112
  107  IPT        INTEGER                          REFS       100       101       105       108       109       110
                                                DEFINED        92        94       105       114
  111  IST        INTEGER                          REFS       111   DEFINED       108
  112  ISTEP      INTEGER                          REFS       110   DEFINED       109
  106  JPT        INTEGER                          REFS        93       101       102       106       109       112       113
                                                     115   DEFINED        91        95       104       113
  104  KERROR     INTEGER                       DEFINED        86       118
    0  NLZERS     INTEGER                 F.P.     REFS        89        91   DEFINED        78        88        97       107

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE  REFERENCES
       MINO       INTEGER    0  INTRIN               101       109
       MINOF      INTEGER    2    SF        84       101       109

STATEMENT LABELS              DEF LINE   REFERENCES
    0  7            INACTIVE      88        87
    0  10                         90        89
   24  13                         94        87
    0  16           INACTIVE      97        96
   31  19                         99       2*93     2*106     2*115
    0  22           INACTIVE     101       100
    0  25                        103       102
   53  28                        107       2*96
   54  31                        108        98       100
    0  34                        113       111
  101  37                        117        93       106       115
  102  99                        118        87       100
  103  100                       120       117
```

```
LOOPS  LABEL   INDEX   FROM-TO   LENGTH  PROPERTIES
   14  10      I        89 90        2B   INSTACK
   43  25      I       102 103       2B   INSTACK
   71  34      I       111 113       2B   INSTACK

STATISTICS
  PROGRAM LENGTH                113B      75
          52000B CM USED
```

```
C45700, SUB  PUTROW (PUT ROW OF A MATRIX ON TAPE)                         PUTROW   2
C                                                                         PUTROW   3
C************************************************************************ PUTROW   4
C                                                                       * PUTROW   5
C***  SUBROUTINE PUTROW (NTAPE ,IPACK ,BUFFER,ICOUNT) ****************** PUTROW   6
C                                                                       * PUTROW   7
C***  OBJECTIVE ******************************************************** PUTROW   8
C     ---------                                                         * PUTROW   9
C     PUTS OUT A ROW OF A MATRIX ON THE UNIT SPECIFIED AND IN THE       * PUTROW  10
C     FORMAT DESIGNATED BY IPACK.  THE ROW CONSISTS OF ICOUNT           * PUTROW  11
C     CONSECUTIVE ELEMENTS.                                             * PUTROW  12
C                                                                       * PUTROW  13
C***  INPUT/OUTPUT ***************************************************** PUTROW  14
C     ------------                                                      * PUTROW  15
C     THE SUBROUTINE RECEIVES A ROW OF A MATRIX FROM THE CALLING        * PUTROW  16
C     ROUTINE AND WRITES IT ON THE SPECIFIED UNIT IN EITHER PACKED OR   * PUTROW  17
C     UNPACKED FORM.                                                    * PUTROW  18
C                                                                       * PUTROW  19
C***  SUMMARY OF SYMBOLS *********************************************** PUTROW  20
C     ------------------                                                * PUTROW  21
C.... BUFFER(I) .... INPUT                                              * PUTROW  22
C     ARRAY HOLDING ONE ROW OF A THE MATRIX WHICH IS TO BE STORED ON    * PUTROW  23
C     DATA SET UNIT NTAPE.                                              * PUTROW  24
C     NOTE THAT WHEN THE PACKING FACTOR IS -1 THIS VARIABLE MUST BE     * PUTROW  25
C     DIMENSIONED TO ICOUNT+1 IN THE CALLING PROGRAM.  FOR OTHER VALUES* PUTROW  26
C     OF THE PACKING FACTORS. THIS VARIABLE IS DIMENSIONED TO ICOUNT.   * PUTROW  27
C                                                                       * PUTROW  28
C.... ICOUNT ....... INPUT                                              * PUTROW  29
C     NUMBER OF ELEMENTS IN THE ARRAY BUFFER(I) AT THE TIME THE         * PUTROW  30
C     SUBROUTINE PUTROW IS CALLED.                                      * PUTROW  31
C     A VALUE OF ZERO (O) OR MINUS ONE (-1) WILL WRITE AN END OF FILE   * PUTROW  32
C     ON DATA SET NTAPE AND RETURN TO THE CALLING PROGRAM.              * PUTROW  33
C                                                                       * PUTROW  34
C.... IPACK ........ INPUT                                              * PUTROW  35
C     CONTROL WORD FOR PACKING AND/OR UNPACKING THE DATA.               * PUTROW  36
C     PACKING IS DONE IN THE USER'S ARRAY, WHICH HOLDS THE ROW,         * PUTROW  37
C     HOWEVER, PROVISIONS HAVE BEEN MADE TO RESTORE THE ROW             * PUTROW  38
C     IF ABSOLUTELY NECESSARY.  VARIOUS VALUES ASSIGNED TO IPACK ARE.   * PUTROW  39
C     IPACK = O,  1. ROW IN STORAGE, BUFFER(I), IS PACKED.              * PUTROW  40
C                 2. LEAVE ROW IN STORAGE, BUFFER(I), PACKED.           * PUTROW  41
C                 3. STORE PACKED ROW, BUFFER(I), ON DATA SET NTAPE.    * PUTROW  42
C                 4. RETURN PACKED ROW IN BUFFER(I).                    * PUTROW  43
C     IPACK = 1,  1. ROW IN STORAGE, BUFFER(I), IS UNPACKED.            * PUTROW  44
C                 2. PACK ROW USING BUFFER(I).                          * PUTROW  45
C                 3. STORE PACKED ROW, BUFFER(I), ON DATA SET NTAPE.    * PUTROW  46
C                 4. RETURN PACKED ROW IN BUFFER(I).                    * PUTROW  47
C     IPACK =-1,  1. ROW IN STORAGE, BUFFER(I), IS UNPACKED.            * PUTROW  48
C                 2. PACK ROW USING BUFFER(I).                          * PUTROW  49
C                 3. STORE PACKED ROW, BUFFER(I), ON DATA SET NTAPE.    * PUTROW  50
C                 4. RETURN UNPACKED ROW IN BUFFER(I).                  * PUTROW  51
C     IPACK = 2,  1. ROW IN STORAGE, BUFFER(I), IS UNPACKED.            * PUTROW  52
C                 2. DO NOT PACK ROW USING BUFFER(I).                   * PUTROW  53
C                 3. STORE UNPACKED ROW, BUFFER(I), ON DATA SET NTAPE.  * PUTROW  54
C                 4. RETURN UNPACKED ROW IN BUFFER(I).                  * PUTROW  55
C                                                                       * PUTROW  56
C.... NTAPE ........ INPUT                                              * PUTROW  57
C     DATA SET UNIT FOR STORING THE MATRIX.                             * PUTROW  58
```

```
      C45730, SUB  ERROR (ADDRESSING ERROR (OC5))                         ERROR       2
      C                                                                   ERROR       3
      C***  SUBROUTINE ERROR  ******************************************** ERROR       4
      C                                                                 * ERROR       5
      C                                                                 * ERROR       6
      C***  OBJECTIVE  *************************************************** ERROR       7
      C     ---------                                                   * ERROR       8
      C                                                                 * ERROR       9
      C     CAUSES A OC5 (ADDRESSING) ERROR TO PROVIDE A DUMP IN        * ERROR      10
      C     CASE OF OTHER ERRORS THAT MAY OCCUR DURINC EXECUTION OF THE * ERROR      11
      C     PROGRAM.  THE SUBROUTINE ERROR IS AN ARGUMENT TO ERRSET -   * ERROR      12
      C     EXTENDED ERROR HANDLING PACKAGE - PROVIDED BY THE COMPUTER  * ERROR      13
      C     MANAGEMENT.                                                 * ERROR      14
      C                                                                 * ERROR      15
      C                                                                 * ERROR      16
      C****************************************************************** ERROR      17
      C                                                                   ERROR      18
            SUBROUTINE ERROR                                              ERROR      19
      C                                                                   ERROR      20
            DIMENSION A(1)                                                ERROR      21
            I      =  300000                                              ERROR      22
            A(I)   =  0.0                                                 ERROR      23
      C                                                                   ERROR      24
            RETURN                                                        ERROR      25
            END                                                           ERROR      26
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    1  ERROR          18           24

VARIABLES      SN  TYPE           RELOCATION
    7  A           REAL      ARRAY                 REFS       20    DEFINED       22
    6  I           INTEGER                         REFS       22    DEFINED       21

STATISTICS
  PROGRAM LENGTH                 10B        8
        52000B CM USED
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  WORDS          43           53

VARIABLES      SN  TYPE            RELOCATION
    0  DESCRI    REAL        ARRAY      F.P.        REFS         45         50   DEFINED        43
   16  N         INTEGER                            REFS       2*50    DEFINED        49
    0  NWORDS    INTEGER                F.P.        REFS       2*45         49   DEFINED        43
    0  TITLE     REAL        ARRAY      F.P.        REFS         45    DEFINED        43        50

STATEMENT LABELS             DEF LINE   REFERENCES
    0  50          INACTIVE      48
    0  100                       51         49

LOOPS  LABEL     INDEX       FROM-TO     LENGTH    PROPERTIES
   12  100       N             49 51         2B     INSTACK

STATISTICS
  PROGRAM LENGTH                  17B        15
         52000B CM USED
```

```
      C45730, SUB. WORDS (STORING OF ALPHAMERIC INFORMATION IN VARIABLES)     WORDS      2
      C                                                                       WORDS      3
      C***  SUBROUTINE WORDS (TITLE,NWORDS,DESCRI)  ************************* WORDS      4
      C                                                                     * WORDS      5
      C                                                                     * WORDS      6
      C***  OBJECTIVE  ****************************************************** WORDS      7
      C     ---------                                                       * WORDS      8
      C                                                                     * WORDS      9
      C     TO STORE THE ALPHAMERIC INFORMATION GIVEN BY THE VARIABLE       * WORDS     10
      C     DESCRI(N) INTO THE VARIABLE TITLE(N).                           * WORDS     11
      C                                                                     * WORDS     12
      C                                                                     * WORDS     13
      C***  SUMMARY OF FORTRAN SYMBOLS  ************************************* WORDS     14
      C     --------------------------                                      * WORDS     15
      C                                                                     * WORDS     16
      C.... DESCRI(N) .... INPUT                                            * WORDS     17
      C     HOLLERITH CHARACTERSTRING DEFINED BY EITHER OF THE FOLLOWING TWO * WORDS     18
      C     WAYS IN THE CALLING STATEMENT.                                  * WORDS     19
      C     1.  NUMC H ABC...XYZ WHERE NUMC REPRESENTS THE NUMBER OF        * WORDS     20
      C         ALPHAMERIC CHARACTERS, H IS THE HOLLERITH CONTROL, AND      * WORDS     21
      C         ABC...XYZ REPRESENTS THE ALPHAMERIC CHARACTERS.             * WORDS     22
      C         BLANKS ON EITHER SIDE OF THE HOLLERITH CONTROL H ARE NOT    * WORDS     23
      C         REQUIRED.  THESE BLANKS ARE INCLUDED HERE FOR CLARITY.      * WORDS     24
      C     2.  @ABC...XYZ@ WHERE THE APOSTROPHES @ @ REPLACE THE NUMBER    * WORDS     25
      C         OF ALPHAMERIC CHARACTERS AND HOLLERITH CONTROL AND ABC...XYZ * WORDS     26
      C         ONCE AGAIN REPRESENTS THE ALPHAMERIC CHARACTERS             * WORDS     27
      C                                                                     * WORDS     28
      C.... NWORDS ....... INPUT                                            * WORDS     29
      C     NUMBER OF WORDS CONSISTING OF @NUMCW@ ALPHAMERIC CHARACTERS TO  * WORDS     30
      C     BE STORED IN THE VARIABLE TITLE(N).  NOTE THAT                  * WORDS     31
      C     NWORDS = (NUMC-1)/NUMCW + 1, WHERE NUMC REPRESENTS THE NUMBER   * WORDS     32
      C     OF ALPHAMERIC CHARACTERS AND NUMCW REPRESENTS THE NUMBER OF     * WORDS     33
      C     CHARACTERS PER WORD BASED UPON THE COMPUTER INSTALLATION.       * WORDS     34
      C                                                                     * WORDS     35
      C.... TITLE(N) ..... OUTPUT                                           * WORDS     36
      C     VARIABLE TO STORE THE HOLLERITH CHARACTERSTRING CONSISTING OF   * WORDS     37
      C     NUMCW ALPHAMERIC CHARACTERS PER WORD.  NOTE THAT THE LAST WORD  * WORDS     38
      C     MAY CONSIST FROM ONE TO NUMCW CHARACTERS.                       * WORDS     39
      C                                                                     * WORDS     40
      C                                                                     * WORDS     41
      C********************************************************************** WORDS     42
      C                                                                       WORDS     43
            SUBROUTINE WORDS  (TITLE,NWORDS,DESCRI)                           WORDS     44
      C                                                                       WORDS     45
            DIMENSION TITLE(NWORDS)     ,DESCRI(NWORDS)                       WORDS     46
      C                                                                       WORDS     47
      C                                                                       WORDS     48
         50 CONTINUE                                                          WORDS     49
            DO 100 N=1,NWORDS                                                 WORDS     50
            TITLE(N) =  DESCRI(N)                                             WORDS     51
        100 CONTINUE                                                          WORDS     52
      C                                                                       WORDS     53
            RETURN                                                            WORDS     54
            END                                                               WORDS     55
```

```
VARIABLES      SN  TYPE           RELOCATION
    0  ITAPEO     INTEGER              F.P.      DEFINED        29     I/O REFS       35        37          39
    0  KPAGE      INTEGER              F.P.        REFS         32          35        37   DEFINED          29
   54  L          INTEGER                          REFS         35          37        39   DEFINED          33
    0  LINES      INTEGER              F.P.        REFS         32          33   DEFINED        29
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS               DEF LINE   REFERENCES
    0  100           INACTIVE     34
    0  150           INACTIVE     36
    0  160           INACTIVE     38
    0  200                        40         33
   36  300                        41         32
   50  1000     FMT               43         35
   52  2000     FMT               44         37         39

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
   13  200       L             33 40        23B                 EXT REFS

STATISTICS
  PROGRAM LENGTH                61B        49
        52000B CM USED
```

```
      C45730, SUB. PLB(NEW PAGE AND/OR SKIP A NUMBER OF LINES - VERSION B)    PLB        2
      C                                                                       PLB        3
      C***  SUBROUTINE PLB (KPAGE,LINES,ITAPEO)  **************************** PLB        4
      C                                                                     * PLB        5
      C                                                                     * PLB        6
      C***  OBJECTIVE  ****************************************************** PLB        7
      C     ---------                                                       * PLB        8
      C                                                                     * PLB        9
      C     TO START A NEW PAGE AND/OR SKIP A NUMBER OF LINES               * PLB       10
      C                                                                     * PLB       11
      C                                                                     * PLB       12
      C***  SUMMARY OF FORTRAN SYMBOLS  ************************************* PLB       13
      C     -------------------------                                       * PLB       14
      C                                                                     * PLB       15
      C.... ITAPEO ....... INPUT                                            * PLB       16
      C     TAPE NUMBER FOR STORING COMPUTER RESULTS ON A FORMATTED TAPE.   * PLB       17
      C                                                                     * PLB       18
      C.... KPAGE ........ INPUT                                            * PLB       19
      C     CONTROL WORD FOR STARTING A NEW PAGE.                           * PLB       20
      C     KPAGE = 1, DO NOT START A NEW PAGE.                             * PLB       21
      C     KPAGE = 2, START A NEW PAGE.                                    * PLB       22
      C                                                                     * PLB       23
      C.... LINES ........ INPUT                                            * PLB       24
      C     NUMBER OF LINES TO BE SKIPPED BETWEEN LISTED INFORMATION.       * PLB       25
      C                                                                     * PLB       26
      C                                                                     * PLB       27
      C********************************************************************** PLB       28
      C                                                                       PLB       29
            SUBROUTINE PLB (KPAGE,LINES,ITAPEO)                               PLB       30
      C                                                                       PLB       31
      C                                                                       PLB       32
            IF (KPAGE .EQ. 1 .AND. LINES  .EQ. 0) GO TO 300                   PLB       33
            DO 200 L=1,LINES                                                  PLB       34
        100 CONTINUE                                                          PLB       35
            IF (KPAGE .EQ. 2 .AND. L .EQ. 1) WRITE (ITAPEO,1000)              PLB       36
        150 CONTINUE                                                          PLB       37
            IF (KPAGE .EQ. 1 .AND. L .EQ. 1) WRITE (ITAPEO,2000)              PLB       38
        160 CONTINUE                                                          PLB       39
            IF (L .GT. 1) WRITE (ITAPEO,2000)                                 PLB       40
        200 CONTINUE                                                          PLB       41
        300 CONTINUE                                                          PLB       42
      C                                                                       PLB       43
       1000 FORMAT ( 1H1)                                                     PLB       44
       2000 FORMAT (   )                                                      PLB       45
      C                                                                       PLB       46
            RETURN                                                            PLB       47
            END                                                               PLB       48
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 PLB	29	46

```
VARIABLES      SN  TYPE          RELOCATION
  102  KLUES      INTEGER    ARRAY                  REFS       55        73        76        80   DEFINED       70
  101  KSUM       INTEGER                           REFS       73        74   DEFINED        71        73
    0  NCC        INTEGER              F.P.         REFS       66        70        72        75   DEFINED       53        66
       VARIABLES USED AS FILE NAMES, SEE ABOVE

INLINE FUNCTIONS   TYPE    ARGS       DEF LINE  REFERENCES
       IABS       INTEGER    1  INTRIN            76
       IABSF      INTEGER    1    SF        59    76

STATEMENT LABELS               DEF LINE  REFERENCES
    0  50                         65        63
   20  100                        70        82
    0  110                        73        72
   51  150                        81        75        77        78
   54  160                        83        74        80
    0  170                        90        87
   75  5020    FMT                92        70

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   12  50       I          63 65        2B       INSTACK
   33  110      J          72 73        4B       INSTACK
   42  150      J          75 81       12B         OPT      EXITS
   61  170      I          87 90        6B       INSTACK

STATISTICS
  PROGRAM LENGTH                132B       90
          52000B CM USED
```

```
                C FUNCTION DEFINITION                                                  CLUES      59
                      IABSF(I)    =  IABS(I)                                           CLUES      60
  60            C                                                                      CLUES      61
                C                                                                      CLUES      62
                C INITIALIZE THE VARIABLES                                             CLUES      63
                      DO 50 I=1,KLUED                                                  CLUES      64
                      KLUE(I)=  0                                                      CLUES      65
  65               50 CONTINUE                                                         CLUES      66
                      IF (NCC    .GT. 20    ) NCC    = 20                              CLUES      67
                C                                                                      CLUES      68
                C                                                                      CLUES      69
                C READ DATA FOR THE CONTROL WORD OPTIONS                                CLUES      70
  70              100 READ (ITAPER,5020) (KLUES(J), J=1,NCC)                           CLUES      71
                      KSUM = 0                                                         CLUES      72
                      DO 110 J = 1,NCC                                                 CLUES      73
                  110 IF (KLUES(J) .NE. 0) KSUM = KSUM + 1                             CLUES      74
                      IF (KSUM .EQ. 0) GO TO 160                                       CLUES      75
  75                  DO 150 J=1,NCC                                                   CLUES      76
                      I       =  IABSF(KLUES(J))                                       CLUES      77
                      IF (I .EQ. 0     ) GO TO 150                                     CLUES      78
                      IF (I .GT. KLUED) GO TO 150                                      CLUES      79
                      KLUE(I)=  I                                                      CLUES      80
  80                  IF (KLUES(J) .LT. 0) GO TO 160                                   CLUES      81
                  150 CONTINUE                                                         CLUES      82
                      GO TO 100                                                        CLUES      83
                  160 CONTINUE                                                         CLUES      84
                C                                                                      CLUES      85
  85            C CHANGE THE VALUE OF THE INPUT DATA CONTROL WORD OPTIONS FROM ZERO TO CLUES      86
                C ONE AND FROM THE I'TH VALUE TO TWO.                                  CLUES      87
                      DO 170 I=1,KLUED                                                 CLUES      88
                      IF (KLUE(I) .EQ. I) KLUE(I) = 2                                  CLUES      89
                      IF (KLUE(I) .EQ. 0) KLUE(I) = 1                                  CLUES      90
  90              170 CONTINUE                                                         CLUES      91
                C                                                                      CLUES      92
                 5020 FORMAT ( 20I4 )                                                  CLUES      93
                C                                                                      CLUES      94
                      RETURN                                                           CLUES      95
  95                  END                                                              CLUES      96
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  CLUES         53           94

VARIABLES      SN  TYPE           RELOCATION
   77  I           INTEGER                         REFS      64      77      78    2*79     3*88     2*89
                                                DEFINED      63      76      87
    0  ITAPER      INTEGER               F.P.   DEFINED      53  I/O REFS    70
  100  J           INTEGER                         REFS      70      73      76      80  DEFINED       70      72
                                                     75
    0  KLUE        INTEGER    ARRAY      F.P.      REFS      55      88      89 DEFINED       53       64      79
                                                     88      89
    0  KLUED       INTEGER               F.P.      REFS      55      63      78      87  DEFINED       53
```

```
C45700. SUB. CLUES (READ CONTROL WORD OPTIONS (CLUES))                  CLUES      2
C                                                                       CLUES      3
C***  SUBROUTINE CLUES (ITAPER,NCC,KLUED,KLUE)  *********************** CLUES      4
C                                                                     * CLUES      5
C***  OBJECTIVE  ****************************************************** CLUES      6
C     ---------                                                       * CLUES      7
C     TO READ CONTROL WORD OPTIONS (CLUES) AND TO MINIMIZE THE AMOUNT * CLUES      8
C     OF DATA ASSOCIATED WITH THESE OPTIONS THAT MUST BE ENTERED INTO * CLUES      9
C     THE PROGRAM FROM CARDS.  A ZERO VALUE IS USED FOR ELIMINATING   * CLUES     10
C     THE OPTIONS WHEREAS A VALUE CORRESPONDING TO THE INDEX ASSOCIATED* CLUES     11
C     WITH THE SEQUENTIAL NUMBER OF THE VARIABLE, KLUE(I), IS USED FOR * CLUES     12
C     EXERCISING THE OPTION.  IN ORDER TO MINIMIZE THE AMOUNT OF DATA * CLUES     13
C     THE USER MUST PROVIDE, THE CONTROL WORD OPTION KLUE(I) IS       * CLUES     14
C     INITIALIZED TO ZERO WITHIN THE PROGRAM.  THE USER IS REQUIRED TO * CLUES     15
C     PROVIDE DATA ONLY FOR THOSE OPTIONS WHICH HE WANTS EXERCISED    * CLUES     16
C     PUNCHED WITHIN FOUR COLUMNS RIGHT JUSTIFIED.                    * CLUES     17
C                                                                     * CLUES     18
C     AFTER THE CONTROL WORD OPTIONS ARE ENTERED FROM CARDS, THE      * CLUES     19
C     PROGRAM CHANGES THESE VALUES.                                   * CLUES     20
C     A VALUE OF ONE (CORRESPONDING TO THE ORIGINAL ZERO VALUE)       * CLUES     21
C     INDICATES THAT THE OPTION IS TO BE DELETED WHEREAS A VALUE OF TWO* CLUES     22
C     (CORRESPONDING TO THE ORIGINAL I'TH VALUE) INDICATES THAT THE   * CLUES     23
C     OPTION IS TO BE EXERCISED.                                      * CLUES     24
C                                                                     * CLUES     25
C                                                                     * CLUES     26
C***  SUMMARY OF SYMBOLS  ********************************************** CLUES     27
C     ------------------                                              * CLUES     28
C                                                                     * CLUES     29
C.... ITAPER ....... INPUT                                            * CLUES     30
C     FORMATTED INPUT UNIT IN USER'S PROGRAM                          * CLUES     31
C                                                                     * CLUES     32
C.... NCC .......... INPUT                                            * CLUES     33
C     NUMBER OF CONTROL WORD OPTIONS (CLUES) THAT MAY BE PUNCHED ON A * CLUES     34
C     SINGLE CARD.  BASED UPON A FORMAT OF 20I4 FOR READING THE DATA  * CLUES     35
C     ASSOCIATED WITH THE VARIABLE KLUE(I) THE VARIABLE NCC MAY HAVE A * CLUES     36
C     VALUE EQUAL TO OR LESS THAN 20.                                 * CLUES     37
C                                                                     * CLUES     38
C.... KLUE(I) ...... OUTPUT                                           * CLUES     39
C     INPUT DATA CONTROL WORD OPTIONS (CLUES) FOR INDICATING, THROUGH * CLUES     40
C     CARD INPUT DATA, WHETHER TO PERFORM THE I'TH OPTION OR NOT.     * CLUES     41
C     KLUE(I) = 0, DO NOT PERFORM THE I'TH OPTION.                    * CLUES     42
C             = I, PERFORM THE I'TH OPTION.                           * CLUES     43
C     SUBSEQUENT TO ENTERING THE DATA THE PROGRAM CHANGES THE VALUES  * CLUES     44
C     OF THE OPTIONS.                                                 * CLUES     45
C     KLUE(I) = 1, DO NOT PERFORM THE I'TH OPTION.                    * CLUES     46
C             = 2, PERFORM THE I'TH OPTION.                           * CLUES     47
C                                                                     * CLUES     48
C.... KLUED .........INPUT                                            * CLUES     49
C     DIMENSION OF THE VARIABLE KLUE(I) IN THE CALLING PROGRAM        * CLUES     50
C                                                                     * CLUES     51
C********************************************************************** CLUES     52
C                                                                       CLUES     53
      SUBROUTINE CLUES (ITAPER,NCC,KLUED,KLUE)                          CLUES     54
C                                                                       CLUES     55
      DIMENSION KLUE(KLUED)       ,KLUES(20)                            CLUES     56
C                                                                       CLUES     57
C                                                                       CLUES     58
```

```
  115                  RETURN                                                  GETROW    116
                       END                                                     GETROW    117



      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  GETROW         60         115

VARIABLES      SN  TYPE            RELOCATION
    0  BUFFER      REAL       ARRAY     F.P.       REFS       63      80      88      90    2*91      99    3*100
                                                 DEFINED      60      92
    0  ICOUNT      INTEGER              F.P.       REFS       63      75      86      91     100     101
                                                 DEFINED      60      81     101     105
  150  IEND        INTEGER                         REFS       87      88      89      92      98
                                                 DEFINED      86      97
  146  IOPK        INTEGER                         REFS       77  DEFINED     74     110
    0  IPACK       INTEGER              F.P.       REFS       77      81     104  DEFINED     60
  151  ISTART      INTEGER                         REFS       89      90      91  DEFINED     87
  154  IWD2        INTEGER                         REFS      109     110
  145  IWORD       INTEGER                         REFS       70      71      74      79      81      87      91
                                                     97      100     105  DEFINED     75
  147  NBYTE       INTEGER                         REFS       80      90      99  DEFINED     79      89      98
  153  NLZERS    * INTEGER                         REFS       91
    0  NTAPE       INTEGER              F.P.       REFS       70      80      90      99     109
                                                 DEFINED      60
  152  SAVE        REAL                            REFS       92  DEFINED     88

EXTERNALS            TYPE   ARGS        REFERENCES
       DREAD                  3              70      80      90      99     109
       PACK                   5             100
       UNPACK                 5              91

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       IABS        INTEGER   1   INTRIN              74      110
       IABSF       INTEGER   1     SF        67      74      110

STATEMENT LABELS                   DEF LINE    REFERENCES
    0  7             INACTIVE         72        2*71
   14  12                             76         111
    0  15            INACTIVE         78          77
   31  17                             84          77
   54  20                             95          77
   75  22                            104          71
    0  23            INACTIVE        105         104
  101  24                            109        2*104
  107  100                           113          82      93     102     107

STATISTICS
  PROGRAM LENGTH                    155B       109
         52000B CM USED
```

```
C*********************************************************************
C
      SUBROUTINE GETROW (NTAPE,IPACK,BUFFER,ICOUNT)
C
C
      DIMENSION BUFFER(ICOUNT)
C
C
C FUNCTION DEFINITION
      IABSF(I)     =  IABS(I)
C
C     PICK UP FIRST WORD AVAILABLE AND IF IT EXISTS GO TO 7
      CALL DREAD (NTAPE,IWORD,4)
      IF (IWORD) 7,7,22
    7     CONTINUE
C         WE HAVE READ PACKING FACTOR
      IOPK = IABSF(IWORD)
      IWORD=ICOUNT
   12     CONTINUE
      IF (IPACK+IOPK-2) 20,15,17
   15     CONTINUE
      NBYTE = 4*IWORD
      CALL DREAD (NTAPE,BUFFER(1),NBYTE)
      IF (IPACK.EQ.O) ICOUNT=IWORD
      GO TO 100
C
   17     CONTINUE
C         MUST UNPACK, READ DATA INTO END OF ROW
      IEND=ICOUNT+1
      ISTART=IEND-IWORD+1
      SAVE=BUFFER(IEND)
      NBYTE = (IEND-ISTART+1)*4
      CALL DREAD (NTAPE,BUFFER(ISTART),NBYTE)
      CALL UNPACK (BUFFER(ISTART),IWORD,BUFFER,ICOUNT,NLZERS)
      BUFFER(IEND)=SAVE
      GO TO 100
C
   20     CONTINUE
C         MUST PACK DATA, THIS MAY EXPAND IT
      IEND=IWORD+1
      NBYTE = (IEND-1)*4
      CALL DREAD (NTAPE,BUFFER(2),NBYTE)
      CALL PACK (BUFFER(2),IWORD,BUFFER(2),ICOUNT,BUFFER(1))
      ICOUNT = ICOUNT+1
      GO TO 100
C
   22 IF (IPACK) 23,24,24
   23 ICOUNT=IWORD
C         USER WANTS COUNT ONLY
      GO TO 100
C
   24 CALL DREAD (NTAPE,IWD2,4)
      IOPK = IABSF(IWD2)
      GO TO 12
C
  100 CONTINUE
C
```

```
C45700. SUB. GETROW (GET ROW OF A MATRIX)                                GETROW     2
C                                                                        GETROW     3
C*********************************************************************** GETROW     4
C                                                                      * GETROW     5
C***  SUBROUTINE GETROW (NTAPE ,IPACK ,BUFFER,ICOUNT) ****************** GETROW     6
C                                                                      * GETROW     7
C***  OBJECTIVE  ******************************************************* GETROW     8
C     ---------                                                        * GETROW     9
C     OBTAINS THE NEXT ROW OF THE MATRIX ON THE SPECIFIED UNIT AND     * GETROW    10
C     STORES THE ROW IN A BUFFER.                                      * GETROW    11
C                                                                      * GETROW    12
C     PRIOR TO A GETROW CALL, THERE MUST BE, A GETLAB CALL. (ONCE PER  * GETROW    13
C     MATRIX)                                                          * GETROW    14
C                                                                      * GETROW    15
C***  INPUT/OUTPUT  **************************************************** GETROW    16
C     ------------                                                     * GETROW    17
C     THIS PROGRAM READS A ROW OF THE MATRIX FROM THE SPECIFIED UNIT   * GETROW    18
C     FOR USE BY THE CALLING ROUTINE.                                  * GETROW    19
C                                                                      * GETROW    20
C***  SUMMARY OF SYMBOLS  ********************************************** GETROW    21
C     ------------------                                               * GETROW    22
C.... BUFFER(I) .... OUTPUT                                            * GETROW    23
C     ARRAY HOLDING ONE ROW OF A MATRIX WHICH IS READ FROM DATA SET    * GETROW    24
C     NTAPE.                                                           * GETROW    25
C     NOTE THAT IN THE CALLING PROGRAM THE ARRAY BUFFER(I) MUST BE     * GETROW    26
C     DIMENSIONED FOR ONE MORE THAN THE NUMBER OF VALUES IN THE        * GETROW    27
C     UNPACKED ARRAY.                                                  * GETROW    28
C                                                                      * GETROW    29
C.... ICOUNT ....... INPUT/OUTPUT                                      * GETROW    30
C     NUMBER OF WORDS IN A ROW.                                        * GETROW    31
C     ROUTINE WILL SET ICOUNT = 0 IF NO ROWS REMAIN.                   * GETROW    32
C                                                                      * GETROW    33
C.... IPACK  ....... INPUT/OUTPUT                                      * GETROW    34
C     PACKING DESIGNATOR WHERE                                         * GETROW    35
C     IPACK = 0, RETURN ROW, BUFFER(I), IN PACKED FORM.                * GETROW    36
C           = 1, RETURN ROW, BUFFER(I), IN UNPACKED FORM.              * GETROW    37
C           =-1, RETURN COUNT OF NUMBER OF WORDS IN A ROW WITHOUT      * GETROW    38
C                READING ROW FROM DATA SET NTAPE.                      * GETROW    39
C     NOTE THAT THE PACKING DESIGNATOR IPACK IN THIS SUBROUTINE HAS A  * GETROW    40
C     DIFFERENT MEANING THAN THAT IN SUBROUTINE PUTROW. IN USING THIS  * GETROW    41
C     SUBROUTINE IPACK MUST HAVE ONE OF THE THREE VALUES GIVEN ABOVE.  * GETROW    42
C                                                                      * GETROW    43
C     IF IPACK IS SET TO -1 BY CALLER, THEN NO TRANSMISSION WILL TAKE  * GETROW    44
C     PLACE BUT ICOUNT WILL BE SET.  THIS IS THE METHOD CALLER WILL    * GETROW    45
C     USE TO SEE HOW MANY ELEMENTS ARE IN THE NEXT ROW.  WHEN IPACK    * GETROW    46
C     IS SET TO -1, ICOUNT REPRESENTS THE NUMBER OF WORDS IN THE ROW   * GETROW    47
C     AS IT APPEARS ON THE VOLUME (DISK OR TAPE).  ICOUNT SHOULD NOT   * GETROW    48
C     BE RESET BY CALLER SINCE IT IS USED WHEN THE ROW IS ACTUALLY     * GETROW    49
C     REQUESTED.                                                       * GETROW    50
C                                                                      * GETROW    51
C.... NTAPE  ....... INPUT/OUTPUT                                      * GETROW    52
C     DATA SET UNIT FROM WHICH THE ROW OF THE MATRIX IS TO BE READ.    * GETROW    53
C                                                                      * GETROW    54
C***  ERROR MESSAGES  ************************************************** GETROW    55
C     --------------                                                   * GETROW    56
C     NONE.                                                            * GETROW    57
C                                                                      * GETROW    58
```

```
INLINE FUNCTIONS   TYPE    ARGS          DEF LINE   REFERENCES
       IABS       INTEGER    1  INTRIN                  80
       IABSF      INTEGER    1    SF         73         80

STATEMENT LABELS                 DEF LINE   REFERENCES
    0  7              INACTIVE      77
   17  10                           84         81
   20  11                           85         83
   24  15                           87        107
   43  17                           95         90
   62  20                          102         85
   72  30                          108         99
  100  32                          115        120
  107  40                          121        116
  121  50                          126         76
  124  100                         128         93        100        124

STATISTICS
  PROGRAM LENGTH                    200B       128
        52000B CM USED
```

```
          32     CONTINUE                                                        PUTROW     116
             IF (J .EQ. O) GO TO 40                                              PUTROW     117
             BUFFER(I)=BUFFER(J)                                                 PUTROW     118
             I=I-1                                                               PUTROW     119
             J=J-1                                                               PUTROW     120
             IF (J.GT.O) GO TO 32                                                PUTROW     121
          40 BUFFER(I)=WORD                                                      PUTROW     122
             CALL UNPACK (BUFFER(I),ICORE(1),BUFFER,ICOUNT,NLZERS)               PUTROW     123
             BUFFER(ISAVE)=SAVE                                                  PUTROW     124
             GO TO 100                                                           PUTROW     125
      C                                                                          PUTROW     126
          50 CALL DCLOSE (NTAPE)                                                 PUTROW     127
      C                                                                          PUTROW     128
         100 CONTINUE                                                            PUTROW     129
             RETURN                                                              PUTROW     130
             END                                                                 PUTROW     131
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  PUTROW          65          129

VARIABLES       SN  TYPE             RELOCATION
   O  BUFFER        REAL       ARRAY     F.P.      REFS       68       92       97    2*104      112      117    2*122
                                                DEFINED       65      117      121      123
 173  I             INTEGER                        REFS      117      118      121      122  DEFINED      113      118
 176  ICORE         INTEGER    ARRAY               REFS       69       88       89      122  DEFINED       82       84
                                                     86      105
   O  ICOUNT        INTEGER              F.P.      REFS       68       75     2*76       86      104      111      122
                                                DEFINED       65
 170  IOUTCT        INTEGER                        REFS      104      105      106      114
   O  IPACK         INTEGER              F.P.      REFS       80       99  DEFINED       65
 165  IPAK          INTEGER                        REFS       81       85       90  DEFINED       80
 164  IROW          INTEGER                        REFS       91       96  DEFINED       75      106
 171  ISAVE         INTEGER                        REFS      112      113      123  DEFINED      111
 174  J             INTEGER                        REFS      116      117      119      120  DEFINED      114      119
 166  NBYTE         INTEGER                        REFS       92       97  DEFINED       91       96
 175  NLZERS     *  INTEGER                        REFS      122
   O  NTAPE         INTEGER              F.P.      REFS       88       89       92       95       97       98      126
                                                DEFINED       65
 172  SAVE          REAL                           REFS      123  DEFINED      112
 167  WORD          REAL                           REFS       95      104      121

EXTERNALS             TYPE     ARGS        REFERENCES
      DCLOSE                     1            126
      DWRITE                     3             88       89       92
      PACK                       5            104
      PRITE                      3             95       97
      UNPACK                     5            122
      WEND                       1             98
```

```
      C                                                                   * PUTROW    59
      C***   ERROR MESSAGES   ******************************************** PUTROW    60
      C      --------------                                               * PUTROW    61
      C      NONE.                                                        * PUTROW    62
      C                                                                   * PUTROW    63
      C******************************************************************** PUTROW    64
      C                                                                     PUTROW    65
             SUBROUTINE PUTROW (NTAPE,IPACK,BUFFER,ICOUNT)                  PUTROW    66
      C                                                                     PUTROW    67
      C                                                                     PUTROW    68
             DIMENSION BUFFER(ICOUNT)                                       PUTROW    69
             DIMENSION  ICORE(2)                                            PUTROW    70
      C                                                                     PUTROW    71
      C                                                                     PUTROW    72
      C FUNCTION DEFINITION                                                  PUTROW    73
             IABSF(I)     =  IABS(I)                                        PUTROW    74
      C                                                                     PUTROW    75
             IROW=ICOUNT                                                    PUTROW    76
             IF((ICOUNT.EQ.0).OR.(ICOUNT.EQ.-1))GO TO 50                    PUTROW    77
          7      CONTINUE                                                   PUTROW    78
      C*     DETERMINE 2ND WORD OF RECORD  -2 IF DATA IS PACKED- ZEROS GATHERED PUTROW 79
      C*                                   -1 IF DATA IS UNPACKED-EXPLICIT ZERO PUTROW 80
             IPAK   =  IABSF(IPACK)                                         PUTROW    81
             IF  (IPAK.EQ.2) GO TO 10                                       PUTROW    82
             ICORE(2)= -2                                                   PUTROW    83
             GO TO 11                                                       PUTROW    84
         10 ICORE(2)= -1                                                    PUTROW    85
         11 IF  (IPAK.EQ.1) GO TO 20                                        PUTROW    86
             ICORE(1)= ICOUNT                                               PUTROW    87
         15      CONTINUE                                                   PUTROW    88
             CALL DWRITE (NTAPE,ICORE(1),4)                                 PUTROW    89
             CALL DWRITE (NTAPE,ICORE(2),4)                                 PUTROW    90
             IF (IPAK.EQ.1) GO TO 17                                        PUTROW    91
             NBYTE = 4*IROW                                                 PUTROW    92
             CALL DWRITE (NTAPE,BUFFER(1),NBYTE)                            PUTROW    93
             GO TO 100                                                      PUTROW    94
      C                                                                     PUTROW    95
         17 CALL PRITE (NTAPE,WORD,4)                                       PUTROW    96
             NBYTE = 4*IROW                                                 PUTROW    97
             CALL PRITE (NTAPE,BUFFER(1),NBYTE)                             PUTROW    98
             CALL WEND (NTAPE)                                              PUTROW    99
             IF (IPACK.EQ.-1) GO TO 30                                      PUTROW   100
             GO TO 100                                                      PUTROW   101
      C                                                                     PUTROW   102
         20      CONTINUE                                                   PUTROW   103
      C*      WE MUST PACK DATA                                             PUTROW   104
             CALL PACK (BUFFER,ICOUNT,BUFFER,IOUTCT,WORD)                   PUTROW   105
             ICORE(1)=IOUTCT+1                                              PUTROW   106
             IROW=IOUTCT                                                    PUTROW   107
             GO TO 15                                                       PUTROW   108
         30      CONTINUE                                                   PUTROW   109
      C*         USER WANTS ROW BACK EXPANDED                               PUTROW   110
      C*         FIRST MOVE DATA, THEN UNPACK IT                            PUTROW   111
             ISAVE=ICOUNT+1                                                 PUTROW   112
             SAVE=BUFFER(ISAVE)                                             PUTROW   113
             I=ISAVE                                                        PUTROW   114
             J=IOUTCT                                                       PUTROW   115
```

```
.45700. SUB  DVALUE (INITIALIZE DECIMAL VARIABLES)                          DVALUE      2
C                                                                           DVALUE      3
C***   SUBROUTINE DVALUE  ********************************************** DVALUE      4
C                                                                         * DVALUE      5
C***   OBJECTIVE  ***************************************************** DVALUE      6
C      ---------                                                          * DVALUE      7
C                                                                         * DVALUE      8
C      TO INITIALIZE DECIMAL VARIABLES TO ANY DESIRED VALUE.              * DVALUE      9
C                                                                         * DVALUE     10
C                                                                         * DVALUE     11
C***   SUMMARY OF SYMBOLS  ********************************************* DVALUE     12
C      ------------------                                                 * DVALUE     13
C                                                                         * DVALUE     14
C.... DVAR(I)   ... OUTPUT                                                * DVALUE     15
C      DECIMAL  TYPE MULTIDIMENSIONED VARIABLE IN THE CALLING PROGRAM     * DVALUE     16
C      WHICH IS TO BE INITIALIZED TO THE VALUE GIVEN BY DVARI.            * DVALUE     17
C                                                                         * DVALUE     18
C.... DVARI  ....  INPUT                                                  * DVALUE     19
C      NUMERICAL VALUE IN DECIMAL FORM FOR INITIALIZING THE VARIABLE      * DVALUE     20
C      DVAR(I).                                                           * DVALUE     21
C                                                                         * DVALUE     22
C...   MAX  ....... INPUT                                                 * DVALUE     23
C      NUMBER OF LOCATIONS IN THE CALLING PROGRAM WHICH ARE TO BE         * DVALUE     24
C      INITIALIZED TO THE GIVEN VALUE. FOR A SINGLY SUBSCRIPTED VARIABLE* DVALUE     25
C      THE INDEX 'MAX' SHOULD BE EQUAL TO THE DIMENSION OF THE VARIABLE * DVALUE     26
C      IN THE CALLING PROGRAM.  FOR A DOUBLY SUBSCRIPTED VARIABLE IN THE* DVALUE     27
C      CALLING PROGRAM THE INDEX 'MAX' IS EQUAL TO THE PRODUCT OF THE    * DVALUE     28
C      TWO DIMENSIONS.  IF A VARIABLE IN THE CALLING PROGRAM IS          * DVALUE     29
C      DIMENSIONED AS DVAR(ID,JD) THEN, MAX = ID*JD.                      * DVALUE     30
C                                                                         * DVALUE     31
C                                                                         * DVALUE     32
C************************************************************************ DVALUE     33
C                                                                           DVALUE     34
       SUBROUTINE DVALUE (DVAR,DVARI,MAX)                                   DVALUE     35
C                                                                           DVALUE     36
       DIMENSION DVAR(MAX)                                                  DVALUE     37
C                                                                           DVALUE     38
       DO 100 I=1,MAX                                                       DVALUE     39
       DVAR(I) =  DVARI                                                     DVALUE     40
  100  CONTINUE                                                             DVALUE     41
C                                                                           DVALUE     42
       RETURN                                                               DVALUE     43
       END                                                                  DVALUE     44
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DVALUE         34           42

VARIABLES      SN  TYPE            RELOCATION
    0  DVAR        REAL        ARRAY     F.P.        REFS       36   DEFINED      34       39
    0  DVARI       REAL                  F.P.        REFS       39   DEFINED      34
   16  I           INTEGER                           REFS       39   DEFINED      38
```

```
VARIABLES      SN  TYPE            RELOCATION
   O  MAX          INTEGER              F.P.        REFS        36         38    DEFINED       34

STATEMENT LABELS               DEF LINE   REFERENCES
   O  100                         40          38

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   12  100       I            38 40         2B      INSTACK

STATISTICS
  PROGRAM LENGTH                  21B        17
          52000B CM USED
```

```
      C45700, SUB. IVALUE (INITIALIZE INTEGER VARIABLES)                 IVALUE      2
      C                                                                  IVALUE      3
      C***  SUBROUTINE IVALUE  ******************************************* IVALUE      4
      C                                                                 * IVALUE      5
      C***  OBJECTIVE  *************************************************** IVALUE      6
      C     ---------                                                   * IVALUE      7
      C                                                                 * IVALUE      8
      C     TO INITIALIZE INTEGER VARIABLES TO ANY DESIRED VALUE.       * IVALUE      9
      C                                                                 * IVALUE     10
      C                                                                 * IVALUE     11
      C***  SUMMARY OF SYMBOLS  ****************************************** IVALUE     12
      C     ------------------                                          * IVALUE     13
      C                                                                 * IVALUE     14
      C.... IVAR(I)  ... OUTPUT                                         * IVALUE     15
      C     INTEGER TYPE MULTIDIMENSIONED VARIABLE IN THE CALLING PROGRAM * IVALUE     16
      C     WHICH IS TO BE INITIALIZED TO THE VALUE GIVE BY IVARI.      * IVALUE     17
      C                                                                 * IVALUE     18
      C.... IVARI ...... INPUT                                          * IVALUE     19
      C     NUMERICAL VALUE IN INTEGER FORM FOR INITIALIZING THE VARIABLE * IVALUE     20
      C     IVAR(I).                                                    * IVALUE     21
      C                                                                 * IVALUE     22
      C.... MAX  ....... INPUT                                          * IVALUE     23
      C     NUMBER OF LOCATIONS IN THE CALLING PROGRAM WHICH ARE TO BE  * IVALUE     24
      C     INITIALIZED TO THE GIVEN VALUE. FOR A SINGLY SUBSCRIPTED VARIABLE* IVALUE     25
      C     THE INDEX 'MAX' SHOULD BE EQUAL TO THE DIMENSION OF THE VARIABLE * IVALUE     26
      C     IN THE CALLING PROGRAM.  FOR A DOUBLY SUBSCRIPTED VARIABLE IN THE* IVALUE     27
      C     CALLING PROGRAM THE INDEX 'MAX' IS EQUAL TO THE PRODUCT OF THE  * IVALUE     28
      C     TWO DIMENSIONS.  IF A VARIABLE IN THE CALLING PROGRAM IS    * IVALUE     29
      C     DIMENSIONED AS IVAR(ID,JD) THEN, MAX = ID*JD.               * IVALUE     30
      C                                                                 * IVALUE     31
      C                                                                 * IVALUE     32
      C****************************************************************** IVALUE     33
      C                                                                  IVALUE     34
            SUBROUTINE IVALUE (IVAR,IVARI,MAX)                           IVALUE     35
      C                                                                  IVALUE     36
            DIMENSION IVAR(MAX)                                          IVALUE     37
      C                                                                  IVALUE     38
            DO 100 I=1,MAX                                               IVALUE     39
            IVAR(I) =  IVARI                                             IVALUE     40
        100 CONTINUE                                                     IVALUE     41
      C                                                                  IVALUE     42
            RETURN                                                       IVALUE     43
            END                                                          IVALUE     44
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 IVALUE	34	42

VARIABLES	SN	TYPE		RELOCATION					
16	I	INTEGER			REFS	39	DEFINED	38	
0	IVAR	INTEGER	ARRAY	F.P.	REFS	36	DEFINED	34	39,
0	IVARI	INTEGER		F.P.	REFS	39	DEFINED	34	

```
VARIABLES      SN  TYPE             RELOCATION
   O  MAX          INTEGER               F.P.        REFS        36        38   DEFINED       34

STATEMENT LABELS                  DEF LINE    REFERENCES
   O  100                             40          38

LOOPS  LABEL      INDEX       FROM-TO     LENGTH     PROPERTIES
   12  100        I              38 40        2B       INSTACK

STATISTICS
  PROGRAM LENGTH                     21B        17
          52000B CM USED
```

```
C45700. SUB. EOFO1 (END OF FILE - VERSION 1)                            EOFO1    2
C                                                                       EOFO1    3
C*********************************************************************** EOFO1    4
C                                                                     * EOFO1    5
C***  SUBROUTINE EOFO1  (ITAPER,TITLE ,LTITLE,KEOF) ******************* EOFO1    6
C                                                                     * EOFO1    7
C***  OBJECTIVE  ****************************************************** EOFO1    8
C     ---------                                                       * EOFO1    9
C     CHECKS FOR AN END OF FILE ON INPUT DATA SET UNIT ITAPER AND SETS * EOFO1   10
C     THE END OF FILE CONTROL WORD OPTION TO ITS PROPER VALUE.        * EOFO1   11
C     ALSO, A TITLE IS READ FROM CARDS CONSISTING OF TWENTY WORDS OR  * EOFO1   12
C     LESS OF FOUR ALPHAMERIC CHARACTERS EACH.                        * EOFO1   13
C                                                                     * EOFO1   14
C***  INPUT/OUTPUT  *************************************************** EOFO1   15
C     ------------                                                    * EOFO1   16
C     INPUT CONSISTS OF THE DATA SET NUMBER AND THE LENGTH OF THE     * EOFO1   17
C     TITLE.  OUTPUT CONSISTS OF THE TITLE AND THE VALUE FOR THE END  * EOFO1   18
C     OF FILE CONTROL WORD OPTION.                                    * EOFO1   19
C                                                                     * EOFO1   20
C***  SUMMARY OF SYMBOLS  ********************************************* EOFO1   21
C     ------------------                                              * EOFO1   22
C.... ITAPER ....... INPUT                                            * EOFO1   23
C     DATA SET UNIT NUMBER FOR ENTERING DATA FROM CARDS.              * EOFO1   24
C                                                                     * EOFO1   25
C.... KEOF ......... OUTPUT                                           * EOFO1   26
C     CONTROL WORD OPTION INDICATING END OF FILE ON UNIT ITAPER.      * EOFO1   27
C     KEOF = 1, END OF FILE ON UNIT ITAPER HAS NOT BEEN REACHED.      * EOFO1   28
C     KEOF = 2, END OF FILE ON UNIT ITAPER HAS BEEN REACHED.          * EOFO1   29
C                                                                     * EOFO1   30
C.... LTITLE ....... INPUT                                            * EOFO1   31
C     NUMBER OF WORDS, OF FOUR ALPHAMERIC CHARACTERS EACH, ASSOCIATED * EOFO1   32
C     WITH THE VARIABLE TITLE(I).                                     * EOFO1   33
C                                                                     * EOFO1   34
C.... TITLE(I) .... OUTPUT                                            * EOFO1   35
C     VARIABLE FOR STORING THE TITLE ENTERED FROM CARDS.              * EOFO1   36
C                                                                     * EOFO1   37
C***  ERROR MESSAGES  ************************************************* EOFO1   38
C     --------------                                                  * EOFO1   39
C     NONE.                                                           * EOFO1   40
C                                                                     * EOFO1   41
C*********************************************************************** EOFO1   42
C                                                                       EOFO1   43
      SUBROUTINE EOFO1 (ITAPER,TITLE,LTITLE,KEOF)                       EOFO1   44
C                                                                       EOFO1   45
      DIMENSION TITLE(LTITLE)                                           EOFO1   46
C                                                                       EOFO1   47
      KEOF   =  2                                                       EOFO1   48
C                                                                       EOFO1   49
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     EOFO1   50
C     READ  (ITAPER,2000,END=1000) TITLE                                EOFO1   51
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        EOFO1   52
C                                                                       EOFO1   53
C                                                                       EOFO1   54
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     EOFO1   55
      READ (ITAPER,2000) TITLE                                          EOFO1   56
      IF (EOF(ITAPER)) 1000, 500                                        EOFO1   57
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        EOFO1   58
```

```
          C                                                         EOFO1     59
            500 KEOF    =   1                                       EOFO1     60
           1000 CONTINUE                                            EOFO1     61
          C                                                         EOFO1     62
           2000 FORMAT ( 20A4)                                      EOFO1     63
          C                                                         EOFO1     64
                RETURN                                              EOFO1     65
                END                                                 EOFO1     66


   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  EOFO1          43          64

VARIABLES     SN  TYPE            RELOCATION
    O  ITAPER     INTEGER              F.P.        REFS       56   DEFINED      43   I/O REFS      55
    O  KEOF       INTEGER              F.P.     DEFINED       43       47       59
    O  LTITLE     INTEGER              F.P.        REFS       45   DEFINED      43
    O  TITLE      REAL         ARRAY   F.P.        REFS       45   DEFINED      43        55
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       EOF        REAL        1               56

STATEMENT LABELS              DEF LINE   REFERENCES
    O  500        INACTIVE       59          56
   21  1000                      60          56
   31  2000     FMT              62          55

STATISTICS
  PROGRAM LENGTH                  33B        27
        52000B CM USED
```

```
C45700, SUB. RWBT (READ OR WRITE BINARY INPUT/OUTPUT UNITS)             RWBT       2
C                                                                       RWBT       3
C********************************************************************** RWBT       4
C                                                                     * RWBT       5
C***  SUBROUTINE RWBT   (ITAPE ,VAR   ,NWORDS) *********************** RWBT       6
C                                                                     * RWBT       7
C***  OBJECTIVE  ****************************************************** RWBT       8
C     ---------                                                       * RWBT       9
C     READS OR WRITES A BINARY INPUT/OUTPUT UNIT IN SINGLE PRECISION  * RWBT      10
C     USING A FAST I/O PROCEDURE BASED UPON THE DIMENSION OF THE      * RWBT      11
C     VARIABLE BEING READ OR WRITTEN.  THE VARIABLE DIMENSION PASSED  * RWBT      12
C     AS AN ARGUMENT INDICATES AN IMPLIED DO LOOP IN THE READ OR WRITE * RWBT     13
C     STATEMENT THEREFORE REDUCING THE NUMBER OF I/O OPERATIONS.      * RWBT      14
C                                                                     * RWBT      15
C***  INPUT/OUTPUT  *************************************************** RWBT      16
C     ------------                                                    * RWBT      17
C     INPUT CONSIST OF STORING THE INFORMATION CONTAINED IN THE       * RWBT      18
C     VARIABLE VAR(I) ON TAPE NTAPE.  OUTPUT CONSISTS OF STORING THE  * RWBT      19
C     INFORMATION READ FROM TAPE NTAPE INTO THE VARIABLE VAR (I).     * RWBT      20
C                                                                     * RWBT      21
C***  SUMMARY OF SYMBOLS  ********************************************* RWBT      22
C     ------------------                                              * RWBT      23
C.... ITAPE ........ INPUT                                            * RWBT      24
C     INPUT/OUTPUT UNIT NUMBER FOR WRITING OR READING.  A NEGATIVE    * RWBT      25
C     VALUE INDICATES A READ OPERATION WHEREAS A POSITIVE VALUE       * RWBT      26
C     INDICATES A WRITE OPERATION.                                    * RWBT      27
C                                                                     * RWBT      28
C.... VAR(I) ....... INPUT/OUTPUT                                     * RWBT      29
C     VARIABLE INTO WHICH INFORMATION IS STORED FOR A READ OPERATION  * RWBT      30
C     OR INFORMATION IS TO BE TAKEN FOR A WRITE OPERATION.            * RWBT      31
C                                                                     * RWBT      32
C.... NWORDS ....... INPUT                                            * RWBT      33
C     NUMBER OF WORDS ASSOCIATED WITH A READ OR WRITE OPERATION.      * RWBT      34
C                                                                     * RWBT      35
C***  ERROR MESSAGES  ************************************************* RWBT      36
C     --------------                                                  * RWBT      37
C     NONE.                                                           * RWBT      38
C                                                                     * RWBT      39
C********************************************************************** RWBT      40
C                                                                       RWBT      41
      SUBROUTINE RWBT (ITAPE,VAR,NWORDS)                                RWBT      42
C                                                                       RWBT      43
      DIMENSION VAR(NWORDS)                                             RWBT      44
C                                                                       RWBT      45
C                                                                       RWBT      46
C INITIAL CONDITIONS                                                    RWBT      47
      NTAPE  =  IABS(ITAPE)                                             RWBT      48
C                                                                       RWBT      49
C                                                                       RWBT      50
C READ OR WRITE FROM TAPE ITAPE                                         RWBT      51
      IF (ITAPE .LT. 0) READ  (NTAPE) VAR                               RWBT      52
      IF (ITAPE .GT. 0) WRITE (NTAPE) VAR                               RWBT      53
C                                                                       RWBT      54
      RETURN                                                            RWBT      55
      END                                                               RWBT      56
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  RWBT           41         54

VARIABLES     SN  TYPE            RELOCATION
    O  ITAPE      INTEGER              F.P.        REFS       47        51        52   DEFINED       41
   35  NTAPE      INTEGER                       DEFINED       47   I/O REFS       51        52
    O  NWORDS     INTEGER              F.P.        REFS       43   DEFINED        41
    O  VAR        REAL        ARRAY    F.P.        REFS       43        52   DEFINED        41        51
       VARIABLES USED AS FILE NAMES, SEE ABOVE

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       IABS       INTEGER    1  INTRIN                47

STATISTICS
  PROGRAM LENGTH                  36B      30
        52000B CM USED
```

```
      C                                                                     TITLES      2
      C45700, TITLES (LIST MAIN AND SUBTITLE AT TOP OF PAGE)                TITLES      3
      C                                                                     TITLES      4
      C***  SUBROUTINE TITLES ********************************************** TITLES      5
      C                                                                   * TITLES      6
      C***  COMPUTER VERSION *********************************************** TITLES      7
      C     ----------------                                              * TITLES      8
      C                                                                   * TITLES      9
      C***  OBJECTIVE ****************************************************** TITLES     10
      C     ---------                                                     * TITLES     11
      C     THE PURPOSE OF THIS PROGRAM                                   * TITLES     12
      C       1.  PRINT A PAGE NUMBER                                     * TITLES     13
      C       2.  PRINT A MAIN HEADING CONSISTING OF TWO LINES OF TEXT AND * TITLES    14
      C           ONE LINE OF SPACING.                                    * TITLES     15
      C       3.  PRINT A SUBHEADING CONSISTING OF ONE LINE OF TEXT AND ONE * TITLES   16
      C           LINE FOR SPACING.                                       * TITLES     17
      C       4.  PRINT NONE OR ANY COMBINATION OF THE ABOVE THREE.       * TITLES     18
      C       5.  INCREMENT THE LINE COUNT APPROPRIATELY DEPENDING ON WHAT * TITLES    19
      C           IS BEING LISTED (SEE ITEMS 1 TO 4 ABOVE)                * TITLES     20
      C                                                                   * TITLES     21
      C***  SUMMARY OF FORTRAN SYMBOLS ************************************* TITLES     22
      C     --------------------------                                    * TITLES     23
      C.... KTITLE ....... INPUT                                          * TITLES     24
      C     PROGRAMMING CONTROL WORD OPTION FOR LISTING ANY COMBINATION OF * TITLES    25
      C     MAIN HEADING, SUBHEADING, AND PAGE NUMBER AND INCREMENT THE LINE * TITLES  26
      C     COUNT APPROPRIATELY                                           * TITLES     27
      C     KITTLE =-1,  DO NOT LIST NOR INCREMENT THE LINE COUNT FOR THE * TITLES     28
      C                  MAIN HEADING AND SUBHEADING                      * TITLES     29
      C            = 0,  DO NOT LIST NOR INCREMENT THE LINE COUNT FOR THE * TITLES     30
      C                  PAGE NUMBER, MAIN HEADING, AND SUBHEADING        * TITLES     31
      C            = 1, LIST THE PAGE NUMBER AND THE MAIN HEADING AND     * TITLES     32
      C                 INCREMENT THE LINE COUNT BY THREE (TWO LINES FOR THE * TITLES  33
      C                 MAIN HEADING PLUS ONE LINE FOR SPACING)           * TITLES     34
      C            = 2, LIST THE PAGE NUMBER, THE MAIN HEADING, AND THE   * TITLES     35
      C                 SUBHEADING AND INCREMENT THE LINE COUNT BY FIVE   * TITLES     36
      C                 (THREE LINES FOR THE MAIN HEADING AND SUBHEADING AND * TITLES  37
      C                 TWO LINES FOR SPACING)                            * TITLES     38
      C            = 3, LIST THE PAGE NUMBER AND THE SUBHEADING AND INCREMENT* TITLES  39
      C                 THE LINE COUNT BY TWO (ONE LINE FOR THE SUBHEADING * TITLES    40
      C                 AND ONE LINE FOR SPACING)                         * TITLES     41
      C                                                                   * TITLES     42
      C***  ERROR MESSAGES ************************************************ TITLES     43
      C     --------------                                                * TITLES     44
      C                                                                   * TITLES     45
      C******************************************************************** TITLES     46
      C                                                                     TITLES     47
      C                                                                     TITLES     48
            SUBROUTINE TITLES (KTITLE)                                      TITLES     49
      C                                                                     TITLES     50
            INTEGER YES                                                     TITLES     51
      C                                                                     TITLES     52
            DIMENSION FMTAO(1)                                              TITLES     53
            DIMENSION FMTP(4)                                               TITLES     54
            DIMENSION SKIP(2)                                               TITLES     55
            DIMENSION TSH(1)        ,TMH(18,2)                              TITLES     56
            DIMENSION TFH(1)                                                TITLES     57
      C                                                                     TITLES     58
```

```
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   TITLES      59
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       TITLES      60
      COMMON /CFMTAO/ FMTAO                                             TITLES      61
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              TITLES      62
      COMMON /REPORT/ KREPOR                                            TITLES      63
      COMMON /CTSH  / KTSH  ,LTSH  ,TSH                                 TITLES      64
      COMMON /CTMH  / KTMH  ,LTMH  ,TMH                                 TITLES      65
      COMMON /CTFH  / KTFH  ,LTFH  ,TFH                                 TITLES      66
      COMMON /CONSTS/ NO    ,YES                                        TITLES      67
C                                                                       TITLES      68
C                                                                       TITLES      69
C INITIAL CONDITIONS                                                    TITLES      70
      DATA SKIP   /4H(110,4H( 73/                                       TITLES      71
      DATA FMTP   /4H(    ,4HX,   ,4H 1A4,4H,I5)/                       TITLES      72
      DATA PAGE   /4HPAGE/                                              TITLES      73
      FMTP(1)=  SKIP(KREPOR)                                            TITLES      74
      KOUNTH =  0                                                       TITLES      75
      IF (KTMH .EQ. YES) KOUNTH = KOUNTH + 3                            TITLES      76
      IF (KTSH .EQ. YES) KOUNTH = KOUNTH + 2                            TITLES      77
      IF (KTFH .EQ. YES) KOUNTH = KOUNTH + 2                            TITLES      78
C                                                                       TITLES      79
C                                                                       TITLES      80
C LIST TITLES AND INCREMENT THE LINE KOUNT                              TITLES      81
C                                                                       TITLES      82
      LSKIPS =  3                                                       TITLES      83
      LINESD =  LINES - (LSKIP+2)                                       TITLES      84
      IF (KOUNT  .GT. LINESD) GO TO 80                                  TITLES      85
      IF (KTITLE .LT. 3     ) GO TO 80                                  TITLES      86
      IF (KTSH   .EQ. NO    ) GO TO 80                                  TITLES      87
      GO TO 110                                                         TITLES      88
   80 CONTINUE                                                          TITLES      89
      IF (KOUNT  .LT. LINES) GO TO 300                                  TITLES      90
      IF (KTITLE .EQ. 0    ) GO TO 300                                  TITLES      91
C                                                                       TITLES      92
C LIST PAGE NUMBER                                                      TITLES      93
C                                                                       TITLES      94
      LSKIP  =  LINEST -(KTPAGE-1)                                      TITLES      95
      CALL PLB (KPAGE,LSKIP,ITAPEW)                                     TITLES      96
      IF (KTPAGE .EQ. 1) GO TO 90                                       TITLES      97
      NPAGE  =  NPAGE + 1                                               TITLES      98
      WRITE (ITAPEW,FMTP)  PAGE,NPAGE                                   TITLES      99
   90 CONTINUE                                                          TITLES     100
C                                                                       TITLES     101
C LIST MAIN HEADING                                                     TITLES     102
C                                                                       TITLES     103
      KOUNT  =  0                                                       TITLES     104
      IF (KTITLE .EQ.-1) GO TO 300                                      TITLES     105
      IF (KTMH .EQ. NO) GO TO 108                                       TITLES     106
      DO 100 I=1,2                                                      TITLES     107
  100 WRITE (ITAPEW,FMTAO) (TMH(L,I), L=1,LTMH)                         TITLES     108
      KOUNT  =  KOUNT + 2                                               TITLES     109
  105 LSKIPS =  1                                                       TITLES     110
  110 CALL PLB (1,LSKIPS,ITAPEW)                                        TITLES     111
      KOUNT  =  KOUNT + LSKIPS                                          TITLES     112
C                                                                       TITLES     113
C LIST SUBHEADING                                                       TITLES     114
C                                                                       TITLES     115
```

```
       108 CONTINUE                                                              TITLES     116
           IF (KTITLE .LT. 2) GO TO 150                                          TITLES     117
           IF (KTSH .EQ. NO) GO TO 150                                           TITLES     118
           WRITE (ITAPEW,FMTAO) (TSH(L), L=1,LTSH)                               TITLES     119
           CALL PLB (1,1,ITAPEW)                                                 TITLES     120
           KOUNT  =  KOUNT + 2                                                   TITLES     121
       150 CONTINUE                                                              TITLES     122
       300 CONTINUE                                                              TITLES     123
     C                                                                           TITLES     124
     C                                                                           TITLES     125
     C LIST FUNCTION HEADING                                                     TITLES     126
     C                                                                           TITLES     127
           IF (KOUNT .GT. KOUNTH) GO TO 400                                      TITLES     128
           IF (KTFH .EQ. NO) GO TO 400                                           TITLES     129
           WRITE (ITAPEW, FMTAO) (TFH(L), L=1,LTFH)                              TITLES     130
           CALL PLB (1,1,ITAPEW)                                                 TITLES     131
           KOUNT  =  KOUNT + 2                                                   TITLES     132
       400 CONTINUE                                                              TITLES     133
     C                                                                           TITLES     134
           RETURN                                                                TITLES     135
           END                                                                   TITLES     136
```

```
   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  TITLES          48          134

VARIABLES      SN  TYPE            RELOCATION
    0  FMTAO       REAL        ARRAY    CFMTAO       REFS         52        60       107       118       129
  200  FMTP        REAL        ARRAY                 REFS         53        98   DEFINED        71        73
  176  I           INTEGER                           REFS        107   DEFINED       106
    2  ITAPEP      INTEGER              COMRWP       REFS         61
    0  ITAPER      INTEGER              COMRWP       REFS         61
    1  ITAPEW      INTEGER              COMRWP       REFS         61        95       110       119       130
                                                 I/O REFS         98       107       118       129
    7  KBPAGE      INTEGER              CLIST        REFS         58
    4  KLABEL      INTEGER              CLIST        REFS         58
    0  KOUNT       INTEGER              CLIST        REFS         58        84        89       108       111       120       127
                                                      131    DEFINED       103       108       111       120       131
   11  KOUNTH      INTEGER              CLIST        REFS         58        75        76        77       127
                                                  DEFINED         74        75        76        77
   12  KOUNTI      INTEGER              CLIST        REFS         58
    1  KPAGE       INTEGER              CLIST        REFS         58        95
    0  KREPOR      INTEGER              REPORT       REFS         62        73
    0  KTFH        INTEGER              CTFH         REFS         65        77       128
    0  KTITLE      INTEGER              F.P.         REFS         85        90       104       116   DEFINED        48
    0  KTMH        INTEGER              CTMH         REFS         64        75       105
    5  KTPAGE      INTEGER              CLIST        REFS         58        94        96
    0  KTSH        INTEGER              CTSH         REFS         63        76        86       117
  177  L           INTEGER                           REFS        107       118       129   DEFINED       107       118       129
    2  LINES       INTEGER              CLIST        REFS         58        83        89
  174  LINESD      INTEGER                           REFS         84   DEFINED        83
   10  LINESG      INTEGER              CLIST        REFS         58
```

```
VARIABLES      SN  TYPE            RELOCATION
     3  LINEST     INTEGER              CLIST         REFS          58       94
   175  LSKIP      INTEGER                            REFS          83       95   DEFINED       94
   173  LSKIPS     INTEGER                            REFS         110      111   DEFINED       82        109
     1  LTFH       INTEGER              CTFH          REFS          65      129
     1  LTMH       INTEGER              CTMH          REFS          64      107
     1  LTSH       INTEGER              CTSH          REFS          63      118
     0  NO         INTEGER              CONSTS        REFS          66       86       105       117        128
     6  NPAGE      INTEGER              CLIST         REFS          58       97        98   DEFINED         97
   150  PAGE       REAL                               REFS          98  DEFINED        72
   204  SKIP       REAL        ARRAY                  REFS          54       73   DEFINED       70
     2  TFH        REAL        ARRAY    CTFH          REFS          56       65       129
     2  TMH        REAL        ARRAY    CTMH          REFS          55       64       107
     2  TSH        REAL        ARRAY    CTSH          REFS          55       63       118
     1  YES        INTEGER              CONSTS        REFS          50       66        75        76         77
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE   ARGS         REFERENCES
        PLB                   3                95        110        119        130

STATEMENT LABELS                DEF LINE    REFERENCES
    35  80                          88          84        85         86
    52  90                          99          96
     0  100                        107         106
     0  105           INACTIVE     109
   100  108                        115         105
    74  110                        110          87
   115  150                        121         116       117
   115  300                        122          89        90        104
   133  400                        132         127       128

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
   60  100       I           106 107        12B                 EXT REFS

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CLIST         11                0 KOUNT  (1)             1 KPAGE  (1)              2 LINES  (1)
                                       3 LINEST (1)             4 KLABEL (1)              5 KTPAGE (1)
                                       6 NPAGE  (1)             7 KBPAGE (1)              8 LINESG (1)
                                       9 KOUNTH (1)            10 KOUNTI (1)
       CFMTAO         1                0 FMTAO  (1)
       COMRWP         3                0 ITAPER (1)             1 ITAPEW (1)              2 ITAPEP (1)
       REPORT         1                0 KREPOR (1)
       CTSH           3                0 KTSH   (1)             1 LTSH   (1)              2 TSH    (1)
       CTMH          38                0 KTMH   (1)             1 LTMH   (1)              2 TMH    (36)
       CTFH           3                0 KTFH   (1)             1 LTFH   (1)              2 TFH    (1)
       CONSTS         2                0 NO     (1)             1 YES    (1)

STATISTICS
  PROGRAM LENGTH                  206B       134
  CM LABELED COMMON LENGTH         76B        62
          52000B CM USED
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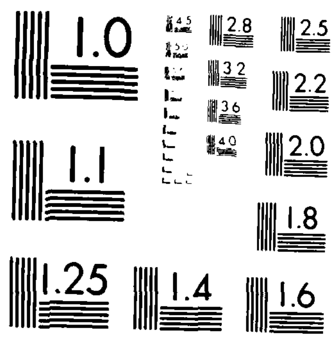
```
C45700, SUB. TIMEA (COMPUTER TIME - VERSION A)                          TIMEA     2
C                                                                       TIMEA     3
C***  SUBROUTINE TIMEA ( KTITLE,KTIME,LTSH,TSH,NCHAR,TEXT)************** TIMEA     4
C                                                                     * TIMEA     5
C***  COMPUTER VERSION  *********************************************** TIMEA     6
C     ----------------                                                * TIMEA     7
C     IBM COMPUTER PROGRAM VERSION                                    * TIMEA     8
C                                                                     * TIMEA     9
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * TIMEA    10
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * TIMEA    11
C     COMPUTER AND SHOULD BE LEFT BLANK.                              * TIMEA    12
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * TIMEA    13
C     BY CCDC IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE CDC      * TIMEA    14
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                     * TIMEA    15
C                                                                     * TIMEA    16
C     CDC COMPUTER PROGRAM VERSION                                    * TIMEA    17
C                                                                     * TIMEA    18
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * TIMEA    19
C     BY CCDC IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE CDC      * TIMEA    20
C     COMPUTER AND SHOULD BE LEFT BLANK.                              * TIMEA    21
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * TIMEA    22
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * TIMEA    23
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                     * TIMEA    24
C                                                                     * TIMEA    25
C***  OBJECTIVE  ****************************************************** TIMEA    26
C     ---------                                                       * TIMEA    27
C     CALCULATE AND LIST THE COMPUTER TIME AT DESIRED INTERVALS, WITH * TIMEA    28
C     THE APPRPRIATE IDENTIFICATION.                                  * TIMEA    29
C                                                                     * TIMEA    30
C                                                                     * TIMEA    31
C***  SUMMARY OF FORTRAN SYMBOLS  ************************************* TIMEA    32
C     -------------------------                                       * TIMEA    33
C.... ITAPEW ....... INPUT                                             * TIMEA    34
C     TAPE NUMBER FOR STORING COMPUTER RESULTS ON A FORMATTED TAPE.   * TIMEA    35
C                                                                     * TIMEA    36
C...  KTIME ........ INPUT                                             * TIMEA    37
C     CONTROL WORD ARGUMENT TO THE FUNCTION ICHRON.                   * TIMEA    38
C     KTIME = 0, CALCULATE THE CURRENT TIME.                          * TIMEA    39
C           = 1, INITIALIZE THE PROGRAM ICHRON TO CALCULATE THE TIME  * TIMEA    40
C                TO 1/100'TH OF A SECOND (FOR IBM COMPUTER ONLY)      * TIMEA    41
C           = 2, INITIALIZE THE PROGRAM ICHRON TO CALCULATE THE TIME  * TIMEA    42
C                TO 1/60 'TH OF A SECOND.                             * TIMEA    43
C           = 3, INITIALIZE THE PROGRAM ICHRON TO CALCULATE THE TIME  * TIMEA    44
C                TO 1/10 'TH OF A SECOND (FOR IBM COMPUTER ONLY)      * TIMEA    45
C                                                                     * TIMEA    46
C...  NCHAR ........ INPUT                                             * TIMEA    47
C     NUMBER OF ALPHAMERIC CHARACTERS WHICH                           * TIMEA    48
C     MAKE UP THE CHARACTERSTRING TEXT(L).  AVALUE OF ZERO WILL SKIP  * TIMEA    49
C     THE LISTING OF THE CHARACTERSTRING TEXT(L).                     * TIMEA    50
C                                                                     * TIMEA    51
C...  TEXT(L) ...... INPUT                                             * TIMEA    52
C     HOLLERITH CHARACTERSTRING DEFINED BY EITHER OF THE FOLLOWING    * TIMEA    53
C     THREE WAYS IN THE CALLING STATEMENT.                            * TIMEA    54
C     1.  NUMC H A3C...XYZ WHERE NUMC REPRESENTS THE NUMBER OF        * TIMEA    55
C         ALPHAMERIC CHARACTERS, H IS THE HOLLERITH CONTROL, AND      * TIMEA    56
C         ABC...XYZ REPRESENTS THE ALPHAMERIC CHARACTERS.             * TIMEA    57
C         BLANKS ON EITHER SIDE OF THE HOLLERITH CONTROL H ARE NOT    * TIMEA    58
```

```
C           REQUIRED.  THESE BLANKS ARE INCLUDED HERE FOR CLARITY.        * TIMEA   59
C       2.  'ABC...XYZ' WHERE THE APOSTROPHES ' ' REPLACE THE NUMBER      * TIMEA   60
C           OF ALPHAMERIC CHARACTERS AND HOLLERITH CONTROL AND ABC...XYZ * TIMEA   61
C           ONCE AGAIN REPRESENTS THE ALPHAMERIC CHARACTERS               * TIMEA   62
C       3.  IN THE CALLING PROGRAM DEFINE AN ARRAY NAME CORRESPONDING     * TIMEA   63
C           TO THE VARIABLE TEXT(L) AND STORE THE APPROPRIATE  ALPHAMERIC* TIMEA   64
C           INFORMATION THROUGH USE OF THE DATA STATEMENT OR THE          * TIMEA   65
C           SUBROUTINE WORDS.                                             * TIMEA   66
C                                                                         * TIMEA   67
C                                                                         * TIMEA   68
C***    ERROR MESSAGES ************************************************** TIMEA   69
C       --------------                                                    * TIMEA   70
C       NONE.                                                             * TIMEA   71
C                                                                         * TIMEA   72
C                                                                         * TIMEA   73
C************************************************************************* TIMEA   74
C                                                                           TIMEA   75
      SUBROUTINE TIMEA (KTITLE,KTIME,LTSHD,TSHD,NCHAR,TEXT)                 TIMEA   76
C                                                                           TIMEA   77
      DIMENSION DENO(3)                                                     TIMEA   78
      DIMENSION TSH(1)              ,TEXT(1)                                TIMEA   79
C                                                                           TIMEA   80
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                                  TIMEA   81
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE       TIMEA   82
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                           TIMEA   83
      COMMON /COMPUT/ KOMPUT,NCHARW                                         TIMEA   84
      COMMON /CTSH  / KTSH  ,LTSH  ,TSH                                     TIMEA   85
C                                                                           TIMEA   86
C                                                                           TIMEA   87
C INITIAL CONDITIONS                                                        TIMEA   88
  100 CONTINUE                                                              TIMEA   89
      IF (KTIME .EQ. 0) GO TO 150                                           TIMEA   90
      DENO(1) =  100.0                                                      TIMEA   91
      DENO(2) =  60.0                                                       TIMEA   92
      DENO(3) =  10.0                                                       TIMEA   93
C                                                                           TIMEA   94
CIBM  BEGINNING OF S⁻ATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         TIMEA   95
C     TIME =  0.0                                                           TIMEA   96
C     MINUE  =  0                                                           TIMEA   97
C     NWORDS =  18                                                          TIMEA   98
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS            TIMEA   99
C                                                                           TIMEA  100
C                                                                           TIMEA  101
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS         TIMEA  102
      TI⁴E    =  SECOND(DUMMY)                                              TIMEA  103
      MINUE   =  TIME/60.0                                                  TIMEA  104
      NWORDS =  8                                                           TIMEA  105
CCDC  FNDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS            TIMEA  106
                                                                            TIMEA  107
  150 CONTINUE                                                              TIMEA  108
      LTEXT  =  (NCHAR-1)/NCHARW + 1                                        TIMEA  109
      IF (NCHAR .EQ. 0) LTEXT = 0                                           TIMEA  110
      INCS=1                                                                TIMEA  111
      INCT   =  (LTEXT-1)/NWORDS + 1                                        TIMEA  112
      IF (LTEXT .EQ. 0) INCT = 0                                            TIMEA  113
      KOUNTI =  INCS + INCT + 2                                             TIMEA  114
C                                                                           TIMEA  115
```

AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER 6/8
PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP
BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2
UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
C
C CALCULATE THE TIME
  200 CONTINUE
      MINUO  =  MINUE
      SECOO  =  TIME
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C     IF (KTIME .GT. O) KVALUE = KTIME
C     TIMEI  =  ICHRON(KTIME)
C     TIME   =  TIMEI/DENO(KVALUE)
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      TIME   =  SECOND(DUMMY)
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
      MINUE  =  TIME/60.O
      TIMES  =  60*MINUE
      SECOE  =  TIME - TIMES
      SECOI  =  TIME - SECOO
      MINUI  =  SECOI/60.O
      FMINUI =  60*MINUI
      SECOI  =  SECOI - FMINUI
C
C
C LIST THE TIME
  300 CONTINUE
      LEFT=LINES-KOUNT
      IF(LEFT.LT.KOUNTI) KOUNT=LINES
      CALL TITLES (KTITLE)
      CALL PLB (1,1,ITAPEW)
      IF (LTEXT .EQ. O) GO TO 320
      WRITE (ITAPEW,1000) (TEXT(L), L=1,LTEXT)
  320 CONTINUE
      WRITE (ITAPEW,1100) MINUE,SECOE
      WRITE (ITAPEW,1200) MINUI,SECOI
      KOUNT=KOUNT+KOUNTI
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C1COO FORMAT ( 10X, 18A4)
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
 1000 FORMAT ( 10X, 8A10)
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
 1100 FORMAT (10X,3X,24HELAPSED TIME IS ........
     1         ,2X,I4,2X,8HMINUTES,,5X,F5.2,2X,7HSECONDS)
 1200 FORMAT (10X,3X,24HINCREMENTAL TIME IS ....
     1         ,2X,I4,2X,8HMINUTES,,5X,F5.2,2X,7HSECONDS)
C
      RETURN
      END
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3 TIMEA           75          167

VARIABLES      SN  TYPE            RELOCATION
  177 DENO         REAL         ARRAY                 REFS         77   DEFINED       90        91        92
  160 DUMMY        REAL                               REFS        102     129
  174 FMINUI       REAL                               REFS        138   DEFINED      137
  164 INCS         INTEGER                            REFS        113   DEFINED      110
  165 INCT         INTEGER                            REFS        113   DEFINED      111       112
    2 ITAPEP       INTEGER             COMRWP         REFS         80
    0 ITAPER       INTEGER             COMRWP         REFS         80
    1 ITAPEW       INTEGER             COMRWP         REFS         80     146   I/O REFS      148       150       151
    7 KBPAGE       INTEGER             CLIST          REFS         81
    4 KLABEL       INTEGER             CLIST          REFS         81
    0 KOMPUT       INTEGER             COMPUT         REFS         83
    0 KOUNT        INTEGER             CLIST          REFS         81     143       152   DEFINED       144       152
   11 KOUNTH       INTEGER             CLIST          REFS         81
   12 KOUNTI       INTEGER             CLIST          REFS         81     144       152   DEFINED       113
    1 KPAGE        INTEGER             CLIST          REFS         81
    0 KTIME        INTEGER              F.P.          REFS         89   DEFINED       75
    0 KTITLE       INTEGER              F.P.          REFS        145   DEFINED       75
    5 KTPAGE       INTEGER             CLIST          REFS         81
    0 KTSH         INTEGER             CTSH           REFS         84
  176 L            INTEGER                            REFS        148   DEFINED      148
  175 LEFT         INTEGER                            REFS        144   DEFINED      143
    2 LINES        INTEGER             CLIST          REFS         81     143       144
   10 LINESG       INTEGER             CLIST          REFS         81
    3 LINEST       INTEGER             CLIST          REFS         81
  163 LTEXT        INTEGER                            REFS        111     112       147       148   DEFINED       108       109
    1 LTSH         INTEGER             CTSH           REFS         84
    0 LTSHD        INTEGER     *UNUSED  F.P.       DEFINED         75
  161 MINUE        INTEGER                            REFS        118     133       150   DEFINED       103       132
  173 MINUI        INTEGER                            REFS        137     151   DEFINED      136
  166 MINUO      * INTEGER                         DEFINED        118
    0 NCHAR        INTEGER              F.P.          REFS        108     109   DEFINED       75
    1 NCHARW       INTEGER             COMPUT         REFS         83     108
    6 NPAGE        INTEGER             CLIST          REFS         81
  162 NWORDS       INTEGER                            REFS        111   DEFINED      104
  171 SECOE        REAL                               REFS        150   DEFINED      134
  172 SECOI        REAL                               REFS        136     138       151   DEFINED       135       138
  167 SECOO        REAL                               REFS        135   DEFINED      119
    0 TEXT         REAL         ARRAY   F.P.          REFS         78     148   DEFINED       75
  157 TIME         REAL                               REFS        103     119       132       134       135
                                                   DEFINED        102     129
  170 TIMES        REAL                               REFS        134   DEFINED      133
    2 TSH          REAL         ARRAY  CTSH           REFS         78      84
    0 TSHD         REAL        *UNUSED  F.P.       DEFINED         75
      VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
      PLB                    3             146
      SECOND       REAL      1             102        129
      TITLES                 1             145
```

```
STATEMENT LABELS                  DEF LINE   REFERENCES
    0   100          INACTIVE        88
   20   150                         107          89
    0   200          INACTIVE       117
    0   300          INACTIVE       142
   75   320                         149         147
  131   1000     FMT                159         148
  133   1100     FMT                162         150
  143   1200     FMT                164         151

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP         3                0 ITAPER (1)          1 ITAPEW (1)          2 ITAPEP (1)
       CLIST         11                0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                                       3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                                       6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                       9 KOUNTH (1)         10 KOUNTI (1)
       COMPUT         2                0 KOMPUT (1)          1 NCHARW (1)
       CTSH           3                0 KTSH   (1)          1 LTSH   (1)          2 TSH    (1)

STATISTICS
  PROGRAM LENGTH                  202B      130
  CM LABELED COMMON LENGTH         23B       19
          52000B CM USED
```

```
 1        C45700. SUB. PROGN. (PROGRAM NAME CONSISTING OF TWO WORDS)                        PROGN       2
          C                                                                                 PROGN       3
                SUBROUTINE PROGN (LT,T,WORD1,WORD2)                                         PROGN       4
          C                                                                                 PROGN       5
 5        C                                                                                 PROGN       6
                DIMENSION TSH(1)                                                            PROGN       7
          C                                                                                 PROGN       8
                COMMON /CTSH  / KTSH  ,LTSH  ,TSH                                           PROGN       9
          C                                                                                 PROGN      10
10              L1     =  LTSH - 1                                                          PROGN      11
                L2     =  LTSH                                                              PROGN      12
                TSH(L1)=  WORD1                                                             PROGN      13
                TSH(L2)=  WORD2                                                             PROGN      14
          C                                                                                 PROGN      15
15              RETURN                                                                      PROGN      16
                END                                                                         PROGN      17
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  PROGN          3           15

VARIABLES      SN  TYPE             RELOCATION
    O  KTSH        INTEGER              CTSH        REFS        8
    O  LT          INTEGER    *UNUSED    F.P.      DEFINED      3
    1  LTSH        INTEGER              CTSH        REFS        8         10         11
   14  L1          INTEGER                          REFS       12    DEFINED         10
   15  L2          INTEGER                          REFS       13    DEFINED         11
    O  T           REAL       *UNUSED    F.P.      DEFINED      3
    2  TSH         REAL        ARRAY    CTSH        REFS        6          8    DEFINED        12         13
    O  WORD1       REAL                  F.P.       REFS       12    DEFINED          3
    O  WORD2       REAL                  F.P.       REFS       13    DEFINED          3

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTSH          3                 O KTSH   (1)              1 LTSH   (1)              2 TSH   (1)

STATISTICS
  PROGRAM LENGTH                  16B        14
  CM LABELED COMMON LENGTH         3B         3
          52000B CM USED
```

```
      C45700, SUB. HEAD (ARRANGE HEADING OF LISTED RESULTS)                  HEAD       2
      C                                                                      HEAD       3
            SUBROUTINE HEAD (LTSHD,TSHD,IROWS,JCOLS)                         HEAD       4
      C                                                                      HEAD       5
            DIMENSION TSH(1)                                                 HEAD       6
      C                                                                      HEAD       7
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE  HEAD       8
           1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                     HEAD       9
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                             HEAD      10
            COMMON /CHEAD / KHEAD ,KRETUR,KOLUMN,IR    ,JCL   ,JCU   ,LSUB   HEAD      11
           1                ,LSKIP                                           HEAD      12
      C                                                                      HEAD      13
      C                                                                      HEAD      14
      C FUNCTION DEFINITION                                                  HEAD      15
      C                                                                      HEAD      16
            MINOF(I,J)    =  MINO(I,J)                                       HEAD      17
      C                                                                      HEAD      18
            IF (KRETUR .EQ. 1 .OR. KRETUR .EQ. 2) GO TO 50                   HEAD      19
            IF (KRETUR .GE. -2) GO TO 20                                     HEAD      20
            IRSAVE =  IR                                                     HEAD      21
            JCSAVE =  JCU                                                    HEAD      22
            KRETUR = -2                                                      HEAD      23
         20 CONTINUE                                                         HEAD      24
            IF (KOUNT .GT. (LINES-LSUB)) KOUNT = LINES                       HEAD      25
            KOUNTS =  KOUNT                                                  HEAD      26
            IF (KRETUR .EQ. 3) GO TO 45                                      HEAD      27
            IF (KRETUR .LT. 0) GO TO 30                                      HEAD      28
            IR     =  0                                                      HEAD      29
            JCU    =  0                                                      HEAD      30
            IRSAVE =  IR                                                     HEAD      31
            JCSAVE =  JCU                                                    HEAD      32
            GO TO 45                                                         HEAD      33
         30 IF (KRETUR .LT. -1) GO TO 45                                     HEAD      34
            IR     = -1                                                      HEAD      35
            JCU    =  0                                                      HEAD      36
            IRSAVE =  IR                                                     HEAD      37
            JCSAVE =  JCU                                                    HEAD      38
         45 IRINIT =  IRSAVE                                                 HEAD      39
            JCINIT = JCSAVE                                                  HEAD      40
            JCU    =  JCINIT                                                 HEAD      41
            IF (IR .LE. -1) IROWS = IR                                       HEAD      42
            KRETUR =  1                                                      HEAD      43
            LINESC =  0                                                      HEAD      44
         50 CONTINUE                                                         HEAD      45
      C                                                                      HEAD      46
            GO TO (100, 200, 900), KRETUR                                    HEAD      47
        100 CONTINUE                                                         HEAD      48
      C                                                                      HEAD      49
            IR     =  IRINIT                                                 HEAD      50
            JCL    =  JCU + 1                                                HEAD      51
            JCU   =  JCU + KOLUMN                                            HEAD      52
            JCU      = MINOF (JCU,JCOLS)                                     HEAD      53
      C                                                                      HEAD      54
        200 CONTINUE                                                         HEAD      55
      C                                                                      HEAD      56
            IF (IR .GE. 0) IR = IR + 1                                       HEAD      57
      C                                                                      HEAD      58
```

```
      CALL TITLES (2)                                                   HEAD      59
      IF (KOUNT .EQ. KOUNTS) GO TO 250                                  HEAD      60
      IF (KOUNT .EQ. 5     ) GO TO 260                                  HEAD      61
      IF (IR   .NE. -1          .AND.                                   HEAD      62
     1    IR .EQ. (IRINIT+1) .AND.                                      HEAD      63
     2    JCL .GT. (JCINIT+1)      ) GO TO 300                          HEAD      64
      IF (KOUNT .GT. KOUNTH) GO TO 350                                  HEAD      65
  250 CALL PLB (1,LSKIP,ITAPEW)                                         HEAD      66
      KOUNTS =  LINES                                                   HEAD      67
      KOUNT  =  KOUNT + LSKIP                                           HEAD      68
C                                                                       HEAD      69
C NOTE THAT THE COMMENTS BETWEEN PSN(255) TO PSN(380)PROVIDE            HEAD      70
C DOCUMENTATION AS TO THE USE OF PROGRAM HEAD                           HEAD      71
C                                                                       HEAD      72
  255 CONTINUE                                                          HEAD      73
C                                                                       HEAD      74
C IN THE CALLING PROGRAM ALL OR SOME OF THE VARIABLES MUST BE           HEAD      75
C INITIALIZED BEFORE THIS ROUTINE IS CALLED.  AN EXAMPLE OF THE         HEAD      76
C INITIALIZED VALUES ARE.                                               HEAD      77
C                                                                       HEAD      78
C     LSKIP  =  1                                                       HEAD      79
C     KRETUR =  0                                                       HEAD      80
C     KOLUMN =  8                                                       HEAD      81
C     LSUB   =  4                                                       HEAD      82
C     IROWS  =  NUROWS                                                  HEAD      83
C     JCOLS  =  NUCOLS                                                  HEAD      84
C                                                                       HEAD      85
C AFTER THE VALUES ARE INITIALIZED THE FOLLOWING CALL TO PROGRAM HEAD   HEAD      86
C IS NEEDED.                                                            HEAD      87
C                                                                       HEAD      88
C XXX CALL HEAD (LTSH,TSH,IROWS,JCOLS)                                  HEAD      89
C                                                                       HEAD      90
C WHERE XXX IS A STATEMENT NUMBER USED IN THE LOGICAL FORTRAN           HEAD      91
C INSTRUCTION APPEARING ABOVE PSN(370).                                 HEAD      92
C                                                                       HEAD      93
C     IN THE CALLING PROGRAM THE FOLLOWING STATEMENT WILL BE NEEDED     HEAD      94
C     TO DIRECT THE PROGRAM TO ONE OF THREE STATEMENTS                  HEAD      95
C                                                                       HEAD      96
C     GO TO (270, 310, 360), KHEAD                                      HEAD      97
C                                                                       HEAD      98
  260 KHEAD  =  1                                                       HEAD      99
  270 CONTINUE                                                          HEAD     100
C                                                                       HEAD     101
C     IN THE CALLING PROGRAM A TITLE WOULD BE WRITTEN HERE              HEAD     102
C     WRITE (ITAPEW,1000)                                               HEAD     103
C                                                                       HEAD     104
      LINESC =  0                                                       HEAD     105
      GO TO 310                                                         HEAD     106
  300 KHEAD  =  2                                                       HEAD     107
  310 KOUNT  =  KOUNT + LSUB - 1                                        HEAD     108
C                                                                       HEAD     109
C     IN THE CALLING PROGRAM  A LINE WILL BE SKIPPED AND ANOTHER        HEAD     110
C     LINE IDENTIFYING THE COLUMNS MAY OR MAY NOT BE WRITTEN            HEAD     111
C     CALL PLB (1,1,ITAPEW)                                             HEAD     112
C     WRITE (ITAPEW,1001) (JC, JC=JCL,JCU)                              HEAD     113
C                                                                       HEAD     114
      GO TO 360                                                         HEAD     115
```

```
      350 KHEAD  =  3                                                   HEAD     116
      360 KOUNT  =  KOUNT + 1                                           HEAD     117
          LINESC =  LINESC + 1                                          HEAD     118
          IF (LINESC .LE. LINESG) GO TO 365                             HEAD     119
          KOUNT  =  KOUNT + 1                                           HEAD     120
          CALL PLB (1,1,ITAPEW)                                         HEAD     121
          LINESC =  1                                                   HEAD     122
      365 CONTINUE                                                      HEAD     123
C                                                                       HEAD     124
C         IN THE CALLING PROGRAM THE ACTUAL VARIABLES (COLUMNS) WOULD BE HEAD     125
C         WRITTEN HERE IN ONE OF SEVERAL WAYS.                          HEAD     126
C         WRITE (ITAPEW,1002) IR, (VAR(IR,JC), JC=JCL,JCU)              HEAD     127
C         WRITE (ITAPEW,1002) JC, (VAR(JC), JC=JCL,JCU)                 HEAD     128
C         WRITE (ITAPEW,1002) IR, VAR1(IR), VAR2(IR), VAR3(IR)          HEAD     129
C         AFTER THE WRITE STATEMENT IN THE CALLING PROGRAM THE FOLLOWING HEAD     130
C         STATEMENT WILL BE NEEDED                                      HEAD     131
C                                                                       HEAD     132
C         IF (KRETUR .LT. 3) GO TO XXX                                  HEAD     133
C                                                                       HEAD     134
      370 CONTINUE                                                      HEAD     135
C                                                                       HEAD     136
C         WHERE XXX REPRESENTS A STATEMENT NUMBER IDENTIFYING A CALL TO HEAD     137
C         SUBROUTINE HEAD                                               HEAD     138
C                                                                       HEAD     139
      380 CONTINUE                                                      HEAD     140
C                                                                       HEAD     141
C                                                                       HEAD     142
          IF (IR .EQ. IROWS .AND. JCU .LT. JCOLS) KRETUR = 1            HEAD     143
          IF (IR .LT. IROWS                    ) KRETUR = 2            HEAD     144
          IF (IR .EQ. IROWS .AND. JCU .EQ. JCOLS) KRETUR = 3            HEAD     145
          IF (KRETUR .LT. 3) GO TO 400                                  HEAD     146
          IRSAVE =  IRINIT                                              HEAD     147
          JCSAVE =  JCINIT                                              HEAD     148
      400 CONTINUE                                                      HEAD     149
C                                                                       HEAD     150
      900 CONTINUE                                                      HEAD     151
C                                                                       HEAD     152
C                                                                       HEAD     153
C FORMATS (REPRESENTATIVE OF WHAT IS NEEDED IN CALLING PROGRAM)         HEAD     154
C                                                                       HEAD     155
C1000 FORMAT ( 10X,48HAPPROPRIATE TITLE ASSOCIATED WITH LISTED COLUMNS) HEAD     156
C1001 FORMAT (10X,1X,4HMODE,2X,5HMODE=,1(   1I3,1X, 3(1H-))             HEAD     157
C    1                                 ,7(   1I4,1X, 9(1H-)))           HEAD     158
C1002 FORMAT ( 10X, I5, 1P8E14.6)                                       HEAD     159
C                                                                       HEAD     160
          RETURN                                                        HEAD     161
          END                                                           HEAD     162
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
46	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  HEAD            3        160

VARIABLES     SN  TYPE           RELOCATION
    3  IR         INTEGER              CHEAD      REFS      10      20      30      36    2*41    2*56    2*61
                                                   142     143     144 DEFINED      28      34      49      56
  176  IRINIT     INTEGER                         REFS      49      61     146 DEFINED      38
    0  IROWS      INTEGER               F.P.      REFS     142     143     144 DEFINED       3      41
  173  IRSAVE     INTEGER                         REFS      38 DEFINED      20      30      36     146
    2  ITAPEP     INTEGER              COMRWP     REFS       9
    0  ITAPER     INTEGER              COMRWP     REFS       9
    1  ITAPEW     INTEGER              COMRWP     REFS       9      65     120
  177  JCINIT     INTEGER                         REFS      40      61     147 DEFINED      39
    4  JCL        INTEGER              CHEAD      REFS      10      61 DEFINED      50
    0  JCOLS      INTEGER               F.P.      REFS      52     142     144 DEFINED       3
  174  JCSAVE     INTEGER                         REFS      39 DEFINED      21      31      37     147
    5  JCU        INTEGER              CHEAD      REFS      10      21      31      37      50      51      52
                                                   142     144 DEFINED      29      35      40      51      52
    7  KBPAGE     INTEGER              CLIST      REFS       7
    0  KHEAD      INTEGER              CHEAD      REFS      10 DEFINED      99     106     115
    4  KLABEL     INTEGER              CLIST      REFS       7
    2  KOLUMN     INTEGER              CHEAD      REFS      10      51
    0  KOUNT      INTEGER              CLIST      REFS       7      24      25      59      60      64      67
                                                   107     116     119 DEFINED      24      67     107     116
                                                   119
   11  KOUNTH     INTEGER              CLIST      REFS       7      64
   12  KOUNTI     INTEGER              CLIST      REFS       7
  175  KOUNTS     INTEGER                         REFS      59 DEFINED      25      66
    1  KPAGE      INTEGER              CLIST      REFS       7
    1  KRETUR     INTEGER              CHEAD      REFS      10    2*18      19      26      27      33      46
                                                   145 DEFINED      22      42     142     143     144
    5  KTPAGE     INTEGER              CLIST      REFS       7
    2  LINES      INTEGER              CLIST      REFS       7    2*24      66
  200  LINESC     INTEGER                         REFS     117     118 DEFINED      43     104     117     121
   10  LINESG     INTEGER              CLIST      REFS       7     118
    3  LINEST     INTEGER              CLIST      REFS       7
    7  LSKIP      INTEGER              CHEAD      REFS      10      65      67
    6  LSUB       INTEGER              CHEAD      REFS      10      24     107
    0  LTSHD      INTEGER   *UNUSED     F.P.    DEFINED      3
    6  NPAGE      INTEGER              CLIST      REFS       7
  201  TSH        REAL      *UNDEF                REFS       5
    0  TSHD       REAL      *UNUSED     F.P.    DEFINED      3

EXTERNALS           TYPE    ARGS        REFERENCES
       PLB                    3            65      120
       TITLES                 1            58

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       MINO       INTEGER     0  INTRIN                52
       MINOF      INTEGER     2    SF        16        52

STATEMENT LABELS             DEF LINE    REFERENCES
   16  20                       23          19
   31  30                       33          27
```

```
STATEMENT LABELS                 DEF LINE   REFERENCES
   35  45                           38          26          32          33
   45  50                           44          18
   55  100                          47          46
   63  200                          54          46
  104  250                          65          59
    0  255          INACTIVE        72
  111  260                          98          60
    0  270          INACTIVE        99
  114  300                         106          61
  115  310                         107         105
  120  350                         115          64
  121  360                         116         114
  130  365                         122         118
    0  370          INACTIVE       134
    0  380          INACTIVE       139
  156  400                         148         145
  156  900                         150          46

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST        11               0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                     3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
                                     6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG (1)
                                     9 KOUNTH (1)             10 KOUNTI (1)
       COMRWP        3               0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CHEAD         8               0 KHEAD  (1)              1 KRETUR (1)              2 KOLUMN (1)
                                     3 IR     (1)              4 JCL    (1)              5 JCU    (1)
                                     6 LSUB   (1)              7 LSKIP  (1)

STATISTICS
  PROGRAM LENGTH                   202B        130
  CM LABELED COMMON LENGTH          26B         22
          52000B CM USED
```

```
C45700. SUB. DOPEN (INITIALIZES DATA SETS ASSOCIATED WITH DSIO)         DOPEN   2
C                                                                       DOPEN   3
C********************************************************************** DOPEN   4
C                                                                     * DOPEN   5
C***  SUBROUTINE DOPEN  (UNIT  ,FIL) ********************************** DOPEN   6
C                                                                     * DOPEN   7
C***  COMPUTER VERSION  *********************************************** DOPEN   8
C     ----------------                                                * DOPEN   9
C     CDC VERSION ONLY.                                               * DOPEN  10
C                                                                     * DOPEN  11
C***  OBJECTIVE  ****************************************************** DOPEN  12
C     ---------                                                       * DOPEN  13
C     INITIALIZES THE DATA SETS ASSOCIATED WITH DSIO (DISK ORIENTED   * DOPEN  14
C     SEQUENTIAL INPUT/OUTPUT SYSTEM)                                 * DOPEN  15
C                                                                     * DOPEN  16
C***  INPUT/OUTPUT  *************************************************** DOPEN  17
C     ------------                                                    * DOPEN  18
C     INPUT CONSISTS OF THE DATA SET AND FILE NUMBERS.  OUTPUT IS THE * DOPEN  19
C     INITIALIZATION OF THE DATA SETS.                                * DOPEN  20
C                                                                     * DOPEN  21
C***  SUMMARY OF SYMBOLS  ********************************************* DOPEN  22
C     ------------------                                              * DOPEN  23
C.... FIL .......... INPUT                                            * DOPEN  24
C     FILE NUMBER ASSOCIATED WITH DATA SET UNIT.                      * DOPEN  25
C                                                                     * DOPEN  26
C.... UNIT ......... INPUT                                            * DOPEN  27
C     INPUT/OUTPUT DATA SET REFERENCE NUMBER.                         * DOPEN  28
C                                                                     * DOPEN  29
C***  ERROR MESSAGES  ************************************************* DOPEN  30
C     --------------                                                  * DOPEN  31
C     NONE.                                                           * DOPEN  32
C                                                                     * DOPEN  33
C********************************************************************** DOPEN  34
C                                                                       DOPEN  35
      SUBROUTINE DOPEN(UNIT,FIL)                                        DOPEN  36
C                                                                       DOPEN  37
      INTEGER FIL,UNIT                                                  DOPEN  38
      INTEGER OWNCODE                                                   DOPEN  39
      INTEGER FILE,FET,BUFFER,BUFSZ,OLDU,OLDOP                          DOPEN  40
      LOGICAL OPEN                                                      DOPEN  41
C                                                                       DOPEN  42
      DIMENSION BUFFER(513,1),BUFSZ(1)                                  DOPEN  43
      DIMENSION FET(54,1)                                               DOPEN  44
C                                                                       DOPEN  45
      COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ                  DOPEN  46
      COMMON /DCOM2 / FET                                               DOPEN  47
      COMMON /DCOM3 / BUFFER                                            DOPEN  48
C                                                                       DOPEN  49
C                                                                       DOPEN  50
C FUNCTION DEFINITION                                                   DOPEN  51
      FILE(I)=FET(14,I).AND.77B                                         DOPEN  52
      OPEN(I)=(FET(14,I).AND.100B).EQ.100B                              DOPEN  53
      NAME(I,J)=FET(J+14,I).AND..NOT.777777B                            DOPEN  54
C                                                                       DOPEN  55
C                                                                       DOPEN  56
      CALL UCHECK(UNIT)                                                 DOPEN  57
      FET(1,UNIT)=NAME(UNIT,FIL).OR.3                                   DOPEN  58
```

```
                FET(2,UNIT)=SHIFT(8,18).OR.LOCF(BUFFER(1,UNIT))          DOPEN     59
                CALL FCHECK(FIL)                                          DOPEN     60
                IF (.NOT.OPEN(UNIT)) GO TO 10                             DOPEN     61
                IF (FILE(UNIT).EQ.FIL) RETURN                             DOPEN     62
                CALL DCLOSE(UNIT)                                         DOPEN     63
             10 FET(14,UNIT)=100B.OR.FIL                                  DOPEN     64
                FET(3,UNIT)=LOCF(BUFFER(1,UNIT))                          DOPEN     65
                FET(4,UNIT)=LOCF(BUFFER(1,UNIT))                          DOPEN     66
                FET(5,UNIT)=LOCF(BUFFER(1,UNIT))+BUFSZ(UNIT)              DOPEN     67
                CALL MOPEN(FET(1,UNIT))                                   DOPEN     68
                OLDU=0                                                    DOPEN     69
                OLDOP=0                                                   DOPEN     70
                FET(1,UNIT)=NAME(UNIT,FIL).OR.3                           DOPEN     71
                END                                                       DOPEN     72
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DOPEN          35          61        71

VARIABLES      SN  TYPE            RELOCATION
    0  BUFFER      INTEGER   ARRAY    DCOM3        REFS        39        42        47        58        64        65        66
    4  BUFSZ       INTEGER   ARRAY    DCOM1        REFS        39        42        45        66
    0  FET         INTEGER   ARRAY    DCOM2        REFS        39        43        46        57        60        61        67
                                                     70   DEFINED        57        58        63        64        65        66
                                                     70
    0  FIL         INTEGER                 F.P.    REFS        37        57        59        61        63        70
                                                DEFINED        35
    1  MAXFILS     INTEGER            DCOM1        REFS        45
    0  MAXUNTS     INTEGER            DCOM1        REFS        45
    3  OLDOP       INTEGER            DCOM1        REFS        39        45   DEFINED        69
    2  OLDU        INTEGER            DCOM1        REFS        39        45   DEFINED        68
   64  OWNCODE  *  INTEGER   *UNDEF                REFS        38
    0  UNIT        INTEGER                 F.P.    REFS        37        56      2*57      2*58        60        61        62
                                                     63      2*64      2*65      3*66        67      2*70
                                                DEFINED        35

EXTERNALS              TYPE   ARGS          REFERENCES
       DCLOSE                   1               62
       FCHECK                   1               59
       MOPEN                    1               67
       UCHECK                   1               56

INLINE FUNCTIONS       TYPE   ARGS        DEF LINE   REFERENCES
       FILE        INTEGER      1    SF        51         39        61
       LOCF        INTEGER      1  INTRIN                 58        64        65        66
       NAME        INTEGER      2    SF        53         57        70
       OPEN        LOGICAL      1    SF        52         40        60
       SHIFT       NO TYPE      2  INTRIN                 58

STATEMENT LABELS               DEF LINE    REFERENCES
   34  10                         63           60
```

```
COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
      DCOM1          5                 0 MAXUNTS(1)                 1 MAXFILS(1)                2 OLDU    (1)
                                       3 OLDOP   (1)                4 BUFSZ  (1)
      DCOM2         54                 0 FET     (54)
      DCOM3        513                 0 BUFFER (513)

STATISTICS
  PROGRAM LENGTH                 65B       53
  CM LABELED COMMON LENGTH     1074B      572
        52000B CM USED
```

```
                  END                                                                        DCLOSE      59


          SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DCLOSE         34           58

VARIABLES      SN  TYPE            RELOCATION
    0  BUFFER      INTEGER    ARRAY    DCOM3         REFS        37        39        44
    4  BUFSZ       INTEGER    ARRAY    DCOM1         REFS        37        39        42
    0  FET         INTEGER    ARRAY    DCOM2         REFS        37        40        43      2*52      2*53      54      55
                                                  DEFINED        55
   43  I         * INTEGER                        DEFINED        52
    1  MAXFILS     INTEGER             DCOM1         REFS        42
    0  MAXUNTS     INTEGER             DCOM1         REFS        42
    3  OLDOP       INTEGER             DCOM1         REFS        37        42   DEFINED       57
    2  OLDU        INTEGER             DCOM1         REFS        37        42   DEFINED       56
    0  UNIT        INTEGER              F.P.         REFS        36        51      2*52     2*53      54     2*55
                                                  DEFINED        34

EXTERNALS           TYPE    ARGS         REFERENCES
       MCLOSE                 1              54
       MEND                   1              53
       UCHECK                 1              51

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       FILE        INTEGER    1    SF        48        37        52        55
       LASTOP      INTEGER    1    SF        49        53
       SHIFT       NO TYPE    2  INTRIN                53

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       DCOM1         5                0 MAXUNTS(1)              1 MAXFILS(1)              2 OLDU    (1)
                                      3 OLDOP  (1)              4 BUFSZ  (1)
       DCOM2        54                0 FET    (54)
       DCOM3       513                0 BUFFER (513)

STATISTICS
  PROGRAM LENGTH                     44B        36
  CM LABELED COMMON LENGTH        1074B       572
        52000B CM USED
```

```
C157OOB  DCLOSE (CLOSES A DATA SET SET REFERENCED BY UNIT)                DCLOSE     2
C                                                                        DCLOSE     3
C*********************************************************************** DCLOSE     4
C                                                                      * DCLOSE     5
C***   SUBROUTINE DCLOSE (UNIT) **************************************** DCLOSE     6
C                                                                      * DCLOSE     7
C***   COMPUTER VERSION  ********************************************** DCLOSE     8
C      ----------------                                                * DCLOSE     9
C      CDC VERSION ONLY.                                               * DCLOSE    10
C                                                                      * DCLOSE    11
C***   OBJECTIVE  ***************************************************** DCLOSE    12
C      ---------                                                       * DCLOSE    13
C      CLOSES A DATA SET REFERENCED BY UNIT.  AN INPUT DATA SET IS     * DCLOSE    14
C      CLOSED WITHOUT REPOSITIONING AND THE BUFFERS ARE RELEASED.  FOR * DCLOSE    15
C      AN OUTPUT DATA SET CLOSING, IT IS EQUIVALENT TO AN END OF FILE  * DCLOSE    16
C      STATEMENT.                                                      * DCLOSE    17
C                                                                      * DCLOSE    18
C***   INPUT/OUTPUT  ************************************************** DCLOSE    19
C      ------------                                                    * DCLOSE    20
C      INPUT CONSISTS OF THE DATA SET UNIT WHICH IS CLUSED AS DESCRIBED * DCLOSE    21
C      IN THE OBJECTIVE.                                               * DCLOSE    22
C                                                                      * DCLOSE    23
C***   SUMMARY OF SYMBOLS  ******************************************** DCLOSE    24
C      ------------------                                              * DCLOSE    25
C....  UNIT .........  INPUT                                           * DCLOSE    26
C      INPUT/OUTPUT DATA SET REFERENCE NUMBER.                         * DCLOSE    27
C                                                                      * DCLOSE    28
C***   ERROR MESSAGES  ************************************************ DCLOSE    29
C      --------------                                                  * DCLOSE    30
C      NONE.                                                           * DCLOSE    31
C                                                                      * DCLOSE    32
C*********************************************************************** DCLOSE    33
C                                                                        DCLOSE    34
       SUBROUTINE DCLOSE(UNIT)                                           DCLOSE    35
C                                                                        DCLOSE    36
       INTEGER UNIT                                                      DCLOSE    37
       INTEGER FILE,FET,BUFFER,BUFSZ,OLDU,OLDOP                          DCLOSE    38
C                                                                        DCLOSE    39
       DIMENSION BUFFER(513,1),BUFSZ(1)                                  DCLOSE    40
       DIMENSION FET(54,1)                                               DCLOSE    41
C                                                                        DCLOSE    42
       COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ                  DCLOSE    43
       COMMON /DCOM2 / FET                                               DCLOSE    44
       COMMON /DCOM3 / BUFFER                                            DCLOSE    45
C                                                                        DCLOSE    46
C                                                                        DCLOSE    47
C FUNCTION DEFINITION                                                    DCLOSE    48
       FILE(I)=FET(14,I).AND.77B                                         DCLOSE    49
       LASTOP(I)=SHIFT(FET(14,I),-7).AND.3                               DCLOSE    50
C                                                                        DCLOSE    51
       CALL UCHECK(UNIT)                                                 DCLOSE    52
       I=FET(14+FILE(UNIT),UNIT).AND.777777B                             DCLOSE    53
       IF (LASTOP(UNIT).EQ.1) CALL MEND(FET(1,UNIT))                     DCLOSE    54
       CALL MCLOSE(FET(1,UNIT))                                          DCLOSE    55
       FET(14,UNIT)=(FILE(UNIT)+1).OR.1600B                              DCLOSE    56
       OLDU=0                                                            DCLOSE    57
       OLDOP=0                                                           DCLOSE    58
```

```
                     END                                                          DFIND      59



       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DFIND          34           57

VARIABLES      SN  TYPE           RELOCATION
    0  BUFFER      INTEGER   ARRAY    DCOM3       REFS      36      39      44
    4  BUFSZ       INTEGER   ARRAY    DCOM1       REFS      36      39      42
    0  FET         INTEGER   ARRAY    DCOM2       REFS      36      40      43      54
    0  FIL         INTEGER              F.P.      REFS      36      53      55   DEFINED     34
    1  MAXFILS     INTEGER            DCOM1       REFS      42
    0  MAXUNTS     INTEGER            DCOM1       REFS      42
    3  OLDOP       INTEGER            DCOM1       REFS      36      42
    2  OLDU        INTEGER            DCOM1       REFS      36      42
    0  UNIT        INTEGER              F.P.      REFS      36      52     2*54     55   DEFINED     34
   33  WRITTEN *   INTEGER   *UNDEF               REFS      36

EXTERNALS            TYPE   ARGS        REFERENCES
       DCLOSE                 1             54
       DOPEN                  2             55
       FCHECK                 1             53
       UCHECK                 1             52

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE  REFERENCES
       OPEN        LOGICAL    1    SF       49         37       54

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DCOM1          5                0 MAXUNTS(1)            1 MAXFILS(1)            2 OLDU    (1)
                                       3 OLDOP  (1)            4 BUFSZ  (1)
       DCOM2         54                0 FET    (54)
       DCOM3        513                0 BUFFER (513)

STATISTICS
  PROGRAM LENGTH                    34B       28
  CM LABELED COMMON LENGTH        1074B      572
          52000B CM USED
```

```
C45700B  DFIND (LOCATES SPECIFIED FILES ON AN I/O UNIT)                    DFIND      2
C                                                                          DFIND      3
C************************************************************************* DFIND      4
C                                                                        * DFIND      5
C***   SUBROUTINE DFIND  (UNIT  ,FIL) ********************************** DFIND      6
C                                                                        * DFIND      7
C***   COMPUTER VERSION  ********************************************** DFIND      8
C      ----------------                                                  * DFIND      9
C      CDC VERSION ONLY.                                                 * DFIND     10
C                                                                        * DFIND     11
C***   OBJECTIVE  ***************************************************** DFIND     12
C      ---------                                                         * DFIND     13
C      LOCATES SPECIFIED FILES ON AN INPUT/OUTPUT UNIT.                  * DFIND     14
C                                                                        * DFIND     15
C***   INPUT/OUTPUT  ************************************************** DFIND     16
C      ------------                                                      * DFIND     17
C      INPUT CONSISTS OF THE DATA SET AND FILE NUMBERS.  OUTPUT          * DFIND     18
C      CONSISTS OF LOCATING THE SPECIFIED FILES.                         * DFIND     19
C                                                                        * DFIND     20
C***   SUMMARY OF SYMBOLS  ******************************************** DFIND     21
C      ------------------                                                * DFIND     22
C....  FIL .......... INPUT                                              * DFIND     23
C      FILE NUMBER ASSOCIATED WITH DATA SET UNIT.                        * DFIND     24
C                                                                        * DFIND     25
C....  UNIT ......... INPUT                                              * DFIND     26
C      INPUT/OUTPUT DATA SET REFERENCE NUMBER.                           * DFIND     27
C                                                                        * DFIND     28
C***   ERROR MESSAGES  ************************************************ DFIND     29
C      --------------                                                    * DFIND     30
C      NONE.                                                             * DFIND     31
C                                                                        * DFIND     32
C************************************************************************* DFIND     33
C                                                                          DFIND     34
      SUBROUTINE DFIND(UNIT,FIL)                                           DFIND     35
C                                                                          DFIND     36
      INTEGER BUFFER,BUFSZ,FET,FIL,OLDOP,OLDU,UNIT,WRITTEN                 DFIND     37
      LOGICAL OPEN                                                         DFIND     38
C                                                                          DFIND     39
      DIMENSION BUFFER(513,1),BUFSZ(1)                                     DFIND     40
      DIMENSION FET(54,1)                                                  DFIND     41
C                                                                          DFIND     42
      COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ                     DFIND     43
      COMMON /DCOM2 / FET                                                  DFIND     44
      COMMON /DCOM3 / BUFFER                                               DFIND     45
C                                                                          DFIND     46
C                                                                          DFIND     47
C                                                                          DFIND     48
C FUNCTION DEFINITION                                                      DFIND     49
      OPEN(I)=(FET(14,I).AND.100B).EQ.100B                                 DFIND     50
C                                                                          DFIND     51
C                                                                          DFIND     52
      CALL UCHECK(UNIT)                                                    DFIND     53
      CALL FCHECK(FIL)                                                     DFIND     54
      IF (OPEN(UNIT)) CALL DCLOSE(UNIT)                                    DFIND     55
      CALL DOPEN(UNIT,FIL)                                                 DFIND     56
C                                                                          DFIND     57
      RETURN                                                               DFIND     58
```

```
VARIABLES      SN  TYPE            RELOCATION
  157  LIMIT     INTEGER                         REFS        53       110       116       122   DEFINED       79
    1  MAXFILS   INTEGER              DCOM1      REFS        60
    0  MAXUNTS   INTEGER              DCOM1      REFS        60
    3  OLDCP     INTEGER              DCOM1      REFS        54        60        73  DEFINED        82
    2  OLDU      INTEGER              DCOM1      REFS        54        60        73  DEFINED        81
  155  OUT       INTEGER                         REFS        53        96        97       105       110       116       119
                                                  121       122       124   DEFINED        80       121       122
    0  UNIT      INTEGER               F.P.      REFS        52        73        75      3*76        77        78        79
                                                   80        81      2*92        95       100       124     2*129       140
                                              DEFINED        49

EXTERNALS           TYPE    ARGS        REFERENCES
       DOPEN                  2               76
       MERR2                  1               92
       MMOVE                  3              119
       MREAD                  1              100       129
       SCHECK                 2               89
       UCHECK                 1               75

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       FILE      INTEGER      1    SF          67        54        76        77
       LASTOP    INTEGER      1    SF          69        92
       LOCF      INTEGER      1  INTRIN                  86
       MINO      INTEGER      0  INTRIN                 116
       MINOF     INTEGER      3    SF          66       116
       OPEN      LOGICAL      1    SF          68        55        76
       SHIFT     NO TYPE      2  INTRIN                  92

STATEMENT LABELS              DEF LINE    REFERENCES
   36   10                       83          73
   52   100                      94         101       139
   63   110                     104          96
   66   120                     109          97
   72   200                     112         106

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       DCOM1         5                0 MAXUNTS(1)                  1 MAXFILS(1)                2 OLDU    (1)
                                      3 OLDOP  (1)                  4 BUFSZ  (1)
       DCOM2        54                0 FET    (54)
       DCOM3       513                0 BUFFER (513)

STATISTICS
  PROGRAM LENGTH                  160B      112
  CM LABELED COMMON LENGTH       1074B      572
         52000B CM USED
```

```
      C     REQUESTED (COUNT) OR LIMIT-OUT                                  DREAD     116
            AMTDATA=MINOF(COUNT,DATA,LIMIT-OUT)                             DREAD     117
      C     MOVE THE DATA TO THE BUFFER. WSA IS(DEST) AND THE BUFFER LOCATION DREAD   118
      C     IS (OUT).                                                       DREAD     119
            CALL MMOVE(OUT,DEST,AMTDATA)                                    DREAD     120
      C     UPDATE THE OUT POINTER TO REFLECT THE AMOUNT OF DATA MOVED      DREAD     121
            OUT=OUT+AMTDATA                                                 DREAD     122
            IF(OUT.GE.LIMIT)OUT=FIRST                                       DREAD     123
      C     PLACE NEW VALUE OF (OUT) INTO THE FET                           DREAD     124
            FET(4,UNIT)=OUT                                                 DREAD     125
      C     DETERMINE AVAILABLE DATA LEFT IN THE BUFFER                     DREAD     126
            DATA=DATA-AMTDATA                                               DREAD     127
      C     IF DATA AVAILABLE IS LESS THEN 1/4 OF THE BUFFER SIZE THEN      DREAD     128
      C     DO A PHYSICAL READ                                              DREAD     129
            IF(DATA.LT.BUFSZ(UNIT)/4) CALL MREAD(FET(1,UNIT))               DREAD     130
      C     DETERMINE THE REQUESTED DATA LEFT (COUNT) BY THE AMOUNT OF DATA DREAD     131
      C     TRANSFERED FROM THE BUFFER                                      DREAD     132
            COUNT=COUNT-AMTDATA                                             DREAD     133
      C     INCREMENT THE POINTER TO THE WSA (DEST) BY THE AMOUNT           DREAD     134
      C     OF DATA MOVED                                                   DREAD     135
            DEST=DEST + AMTDATA                                             DREAD     136
      C     IF THERE IS NO MORE DATA AVAILABLE, UPDATE THE UNIT STATUS WORD DREAD     137
      C     (WORD 14) AND RETURN                                            DREAD     138
      C     ELSE IF                                                         DREAD     139
            IF(COUNT.GT.0) GO TO 100                                        DREAD     140
            FET(14,UNIT)=500B.OR.FILENO                                     DREAD     141
            RETURN                                                          DREAD     142
            END                                                             DREAD     143
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  DREAD         49
    3  PREAD         72        141

VARIABLES     SN  TYPE           RELOCATION
  150  AMTDATA   INTEGER                           REFS       51      119      121      126      132      135
                                               DEFINED      116
    0  BUFFER    INTEGER     ARRAY    DCOM3        REFS       54       57       62
    4  BUFSZ     INTEGER     ARRAY    DCOM1        REFS       54       57       60      129
    0  BYTES     INTEGER                F.P.       REFS       52       85  DEFINED       49
    0  CORE      INTEGER                F.P.       REFS       52       86  DEFINED       49
  153  COUNT     INTEGER                           REFS       53       89      116      132      139
                                               DEFINED       85      132
  151  DATA      INTEGER                           REFS       51      116      126      129  DEFINED      105      110
                                                    126
  152  DEST      INTEGER                           REFS       53       89      119      135  DEFINED       86      135
    0  FET       INTEGER     ARRAY    DCOM2        REFS       54       58       61     2*76       77       78       79
                                                     80       92       95      100      129  DEFINED      124      140
  147  FILENO    INTEGER                           REFS       51      140  DEFINED       77
  156  FIRST     INTEGER                           REFS       53      110      122  DEFINED       78
  154  IN        INTEGER                           REFS       53       96       97      105      110
                                               DEFINED       95
```

```
      DIMENSION FET(54,1)
C
      COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ
      COMMON /DCOM2 / FET
      COMMON /DCOM3 / BUFFER
C
C
C FUNCTION DEFINITION
      MINOF(I1,I2,I3)  =  MINO(I1,I2,I3)
      FILE(I)=FET(14,I).AND.77B
      OPEN(I)=(FET(14,I).AND.100B).EQ.100B
      LASTOP(I)=SHIFT(FET(14,I),-7).AND.3
C
C
      ENTRY PREAD
      IF (UNIT.EQ.OLDU .AND. OLDOP.EQ.2) GO TO 10
C     ELSE
      CALL UCHECK(UNIT)
      IF(.NOT.OPEN(UNIT)) CALL DOPEN(UNIT,FILE(UNIT))
      FILENO=FILE(UNIT)
      FIRST=FET(2,UNIT) .AND. 777777B
      LIMIT=FET(5,UNIT) .AND. 777777B
      OUT=FET(4,UNIT)
      OLDU=UNIT
      OLDOP=2
   10 CONTINUE
C     CALCULATE NUMBER OF CDC WORDS TO BE READ FROM THE FILE
      COUNT=BYTES/4
      DEST=LOCF(CORE)
C     CHECK IF WSA (DEST) IS A VALID ADDRESS
C     IF INVALID ADDRESS, THEN SUB SCHECK WILL TERMINATE THE PROGRAM
      CALL SCHECK(DEST,COUNT)
C     IF LAST OPERATION WAS A WRITE, MERR2 WILL TERMINATE THE PROGRAM
C     SINCE A READ FOLLOWING A WRITE IS ILLEGAL
      IF(LASTOP(UNIT).EQ.1) CALL MERR2(UNIT)
C     DETERMINE AMOUNT OF DATA IN THE CIRCULAR BUFFER
  100 CONTINUE
      IN=FET(3,UNIT)
      IF(IN.GT.OUT) GO TO 110
      IF(OUT.GT.IN) GO TO 120
C     ELSE BUFFER IS EMPTY
C     READ IN MORE DATA
      CALL MREAD(FET(1,UNIT))
      GO TO 100
C     ELSE IN >OUT
C     AVAILABLE DATA IS
  110 CONTINUE
      DATA=IN-OUT
      GO TO 200
C     ELSE OUT > IN
C     AVAILABLE BUFFER DATA IS
  120 CONTINUE
      DATA=LIMIT-OUT+IN-FIRST
C
  200 CONTINUE
C     AMOUNT OF DATA TO BE TRANSFERRED FROM THE BUFFER MUST BE THE
C     SMALLER OF DATA AVAILABLE  (DATA) IN THE BUFFER OR THE DATA
```

```
C457008. DREAD (UNFORMATTED FORTRAN READ OF A COMPLETE LIST)             DREAD      2
C                                                                        DREAD      3
C*********************************************************************** DREAD      4
C                                                                      * DREAD      5
C***  SUBROUTINE DREAD  (UNIT  ,CORE  ,BYTES)************************** DREAD      6
C                                                                      * DREAD      7
C***  COMPUTER VERSION  *********************************************** DREAD      8
C     ----------------                                                 * DREAD      9
C     CDC VERSION ONLY.                                                * DREAD     10
C                                                                      * DREAD     11
C***  OBJECTIVE  ****************************************************** DREAD     12
C     ---------                                                        * DREAD     13
C     CORRESPONDS TO AN UNFORMATTED FORTRAN READ STATEMENT OF A        * DREAD     14
C     COMPLETE LIST.  THE COMPLETE LIST OF DATA IS MOVED INTO A        * DREAD     15
C     CONTINUOUS AREA OF STORAGE WITH THE REMAINDER OF THE LOGICAL     * DREAD     16
C     RECORD, IF ANY, SKIPPED.                                         * DREAD     17
C     ENTRY POINT PREAD CORRESPONDS TO AN UNFORMATTED FORTRAN READ     * DREAD     18
C     STATEMENT OF A PARTIAL LIST.  THE PARTIAL LIST OF DATA IS MOVED  * DREAD     19
C     INTO A CONTINUOUS AREA OF STORAGE WITH THE REMAINDER OF THE      * DREAD     20
C     LOGICAL RECORD, IF ANY, HELD IN THE BUFFER TO SATISFY FURTHER    * DREAD     21
C     CALLS TO PREAD.  COMPLETION OF THE LOGICAL RECORD IS INDICATED   * DREAD     22
C     BY A CALL TO REND.                                               * DREAD     23
C                                                                      * DREAD     24
C***  INPUT/OUTPUT  *************************************************** DREAD     25
C     ------------                                                     * DREAD     26
C     INPUT CONSISTS OF THE DATA SET NUMBER AND NUMBER OF BYTES WHICH  * DREAD     27
C     ARE TO BE READ FROM THE DATA SET UNIT.  OUTPUT CONSISTS OF       * DREAD     28
C     STORING THE DATA INTO THE VARIABLE CORE.                         * DREAD     29
C                                                                      * DREAD     30
C***  SUMMARY OF SYMBOLS  ********************************************* DREAD     31
C     ------------------                                               * DREAD     32
C.... CORE ......... OUTPUT                                            * DREAD     33
C     VARIABLE (STORAGE AREA) INTO WHICH DATA, THAT HAS BEEN READ FROM * DREAD     34
C     DATA SET UNIT, ARE TO BE STORED.                                 * DREAD     35
C                                                                      * DREAD     36
C.... BYTES ........ INPUT                                               DREAD     37
C     NUMBER OF BYTES TO BE READ FROM DATA SET UNIT AND STORED INTO    * DREAD     38
C     THE VARIABLE CORE.                                               * DREAD     39
C                                                                      * DREAD     40
C.... UNIT ......... INPUT                                             * DREAD     41
C     INPUT/OUTPUT DATA SET REFERENCE NUMBER.                          * DREAD     42
C                                                                      * DREAD     43
C***  ERROR MESSAGES  ************************************************* DREAD     44
C     --------------                                                   * DREAD     45
C     NONE.                                                            * DREAD     46
C                                                                      * DREAD     47
C*********************************************************************** DREAD     48
C                                                                        DREAD     49
      SUBROUTINE DREAD(UNIT,CORE,BYTES)                                  DREAD     50
C                                                                        DREAD     51
      INTEGER FILENO,AMTDATA,DATA                                        DREAD     52
      INTEGER UNIT,CORE,BYTES                                            DREAD     53
      INTEGER DEST,COUNT,IN,OUT,FIRST,LIMIT                              DREAD     54
      INTEGER FILE,FET,BUFFER,BUFSZ,OLDU,OLDOP                           DREAD     55
      LOGICAL OPEN                                                       DREAD     56
C                                                                        DREAD     57
      DIMENSION BUFFER(513,1),BUFSZ(1)                                   DREAD     58
```

```
VARIABLES      SN  TYPE            RELOCATION
                                               DEFINED      90
  143  SOURCE     INTEGER                        REFS       50       87       114       130   DEFINED      84      130
  151  SPACE      INTEGER                        REFS       50      111       121       124   DEFINED      94      100
                                                  105      121
    O  UNIT       INTEGER              F.P.      REFS       49       71        73      3*74        75      76       77
                                                   78       79       90       119     2*124       135   2*136
                                               DEFINED      47

EXTERNALS           TYPE   ARGS        REFERENCES
       DOPEN                 2            74
       MMOVE                 3           114
       MWRITE                1           124
       SCHECK                2            87
       UCHECK                1            73

INLINE FUNCTIONS    TYPE   ARGS        DEF LINE  REFERENCES
       FILE       INTEGER    1    SF       65         52       74       75
       LOCF       INTEGER    1  INTRIN                84
       MINO       INTEGER    O  INTRIN               111
       MINOF      INTEGER    3    SF       64        111
       NAME       INTEGER    2    SF       67        136
       OPEN       LOGICAL    1    SF       66         53       74

STATEMENT LABELS              DEF LINE   REFERENCES
   36   10                       81          71
   43   100                      89         134
   54   110                      99          91
   61   120                     104          92
   64   200                     107          96        101

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DCOM1         5               O MAXUNTS(1)               1 MAXFILS(1)              2 OLDU    (1)
                                     3 OLDOP   (1)              4 BUFSZ   (1)
       DCOM2        54               O FET     (54)
       DCOM3       513               O BUFFER (513)

STATISTICS
  PROGRAM LENGTH                 154B       108
  CM LABELED COMMON LENGTH      1074B.      572
          52000B CM USED
```

```
      C     UPDATE THE IN POINTER TO REFLECT THE AMOUNT OF DATA MOVED           DWRITE    116
            IN=IN+AMTDATA                                                       DWRITE    117
            IF(IN.GE.LIMIT)IN=FIRST                                             DWRITE    118
      C     PLACE NEW VALUE OF (IN) INTO THE FET                                DWRITE    119
            FET(3,UNIT)=IN                                                      DWRITE    120
      C     DETERMINE AVAILABLE SPACE LEFT IN THE BUFFER                        DWRITE    121
            SPACE=SPACE-AMTDATA                                                 DWRITE    122
      C     IF SPACE AVAILABLE IS LESS THEN 1/4 OF THE BUFFER SIZE THEN         DWRITE    123
      C     DO A PHYSICAL WRITE                                                 DWRITE    124
            IF(SPACE.LT.BUFSZ(UNIT)/4) CALL MWRITE(FET(1,UNIT))                 DWRITE    125
      C     DETERMINE THE AVAILABLE DATA LEFT (COUNT) BY THE AMOUNT OF DATA     DWRITE    126
      C     TRANSFERRED TO THE BUFFER                                           DWRITE    127
            COUNT=COUNT-AMTDATA                                                 DWRITE    128
      C     INCREMENT THE POINTER TO THE WSA (SOURCE) BY THE AMOUNT             DWRITE    129
      C     OF DATA MOVED                                                       DWRITE    130
            SOURCE=SOURCE + AMTDATA                                             DWRITE    131
      C     IF THERE IS NO MORE DATA AVAILABLE, UPDATE THE UNIT STATUS WORD     DWRITE    132
      C     (WORD 14) AND RETURN                                                DWRITE    133
      C     ELSE IF                                                             DWRITE    134
            IF(COUNT.GT.O) GO TO 100                                            DWRITE    135
            FET(14,UNIT)=300B.OR.FILENO                                         DWRITE    136
            FET(14+FILENO,UNIT)=NAME(UNIT,FILENO)                               DWRITE    137
            RETURN                                                              DWRITE    138
            END                                                                 DWRITE    139
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  DWRITE         47
    3  PRITE          70         137

VARIABLES     SN  TYPE          RELOCATION
  153  AMTDATA   INTEGER                        REFS       51     114     116     121     127     130
                                             DEFINED      111
    0  BUFFER    INTEGER    ARRAY    DCOM3      REFS       52      55      60
    4  BUFSZ     INTEGER    ARRAY    DCOM1      REFS       52      55      58     124
    0  BYTES     INTEGER              F.P.      REFS       49      83 DEFINED      47
    0  CORE      INTEGER              F.P.      REFS       49      84 DEFINED      47
  144  COUNT     INTEGER                        REFS       50      87     111     127     134
                                             DEFINED       83     127
    0  FET       INTEGER    ARRAY    DCOM2      REFS       52      56      59    2*74      75      76      77
                                                  78       90     124     136 DEFINED     119     135     136
  152  FILENO    INTEGER                        REFS       51     135   2*136 DEFINED      75
  147  FIRST     INTEGER                        REFS       50      94     100     117 DEFINED      76
  145  IN        INTEGER                        REFS       50      91      92     100     105     111     114
                                                 116      117     119 DEFINED      78     116     117
  150  LIMIT     INTEGER                        REFS       50      94     100     111     117
                                             DEFINED       77
    1  MAXFILS   INTEGER             DCOM1      REFS       58
    0  MAXUNTS   INTEGER             DCOM1      REFS       58
    3  OLDOP     INTEGER             DCOM1      REFS       52      58      71 DEFINED      80
    2  OLDU      INTEGER             DCOM1      REFS       52      58      71 DEFINED      79
  146  OUT       INTEGER                        REFS       50      91      92     100     105
```

```
      COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ                  DWRITE     59
      COMMON /DCOM2 / FET                                               DWRITE     60
      COMMON /DCOM3 / BUFFER                                            DWRITE     61
C                                                                       DWRITE     62
C                                                                       DWRITE     63
C FUNCTION DEFINITION                                                   DWRITE     64
      MINOF(I1,I2,I3)  =  MINO(I1,I2,I3)                                DWRITE     65
      FILE(I)=FET(14,I).AND.77B                                         DWRITE     66
      OPEN(I)=(FET(14,I).AND.100B).EQ.100B                              DWRITE     67
      NAME(I,J)=FET(J+14,I).AND..NOT.777777B                            DWRITE     68
C                                                                       DWRITE     69
C                                                                       DWRITE     70
      ENTRY PRITE                                                       DWRITE     71
      IF (UNIT.EQ.OLDU .AND. OLDOP.EQ.1) GO TO 10                       DWRITE     72
C     ELSE                                                              DWRITE     73
      CALL UCHECK(UNIT)                                                 DWRITE     74
      IF(.NOT.OPEN(UNIT)) CALL DOPEN(UNIT,FILE(UNIT))                   DWRITE     75
      FILENO=FILE(UNIT)                                                 DWRITE     76
      FIRST=FET(2,UNIT) .AND. 777777B                                   DWRITE     77
      LIMIT=FET(5,UNIT) .AND. 777777B                                   DWRITE     78
      IN=FET(3,UNIT)                                                    DWRITE     79
      OLDU=UNIT                                                         DWRITE     80
      OLDOP=1                                                           DWRITE     81
   10 CONTINUE                                                          DWRITE     82
C     CALCULATE NUMBER OF CDC WORDS TO BE WRITTEN TO THE FILE           DWRITE     83
      COUNT=BYTES/4                                                     DWRITE     84
      SOURCE=LOCF(CORE)                                                 DWRITE     85
C     CHECK IF WSA (SOURCE) IS A VALID ADDRESS                          DWRITE     86
C     IF INVALID ADDRESS, THEN SUB SCHECK WILL TERMINATE THE PROGRAM    DWRITE     87
      CALL SCHECK(SOURCE,COUNT)                                         DWRITE     88
C     DETERMINE FREE SPACE IN THE CIRCULAR BUFFER                       DWRITE     89
  100 CONTINUE                                                          DWRITE     90
      OUT=FET(4,UNIT)                                                   DWRITE     91
      IF(IN.GT.OUT) GO TO 110                                           DWRITE     92
      IF(OUT.GT.IN) GO TO 120                                           DWRITE     93
C     CALCULATE AVAILABLE BUFFER SPACE                                  DWRITE     94
      SPACE=LIMIT-FIRST-1                                               DWRITE     95
C                                                                       DWRITE     96
      GO TO 200                                                         DWRITE     97
C     ELSE IN> OUT                                                      DWRITE     98
C     AVAILABLE SPACE IS                                                DWRITE     99
  110 CONTINUE                                                          DWRITE    100
      SPACE=(LIMIT-IN)+(OUT-FIRST)-1                                    DWRITE    101
      GO TO 200                                                         DWRITE    102
C     ELSE OUT > IN                                                     DWRITE    103
C     AVAILABLE BUFFER SPACE IS                                         DWRITE    104
  120 CONTINUE                                                          DWRITE    105
      SPACE=OUT-IN-1                                                    DWRITE    106
C                                                                       DWRITE    107
  200 CONTINUE                                                          DWRITE    108
C     AMOUNT OF DATA TO BE TRANSFERRED TO THE BUFFER MUST BE THE SMALLER DWRITE    109
C     OF DATA AVAILABLE (COUNT) OR THE BUFFER SPACE AVAILABLE (SPACE)   DWRITE    110
C     OR LIMIT-IN                                                       DWRITE    111
      AMTDATA=MINOF(COUNT,SPACE,LIMIT-IN)                               DWRITE    112
C     MOVE THE DATA TO THE BUFFER. WSA IS(SOURCE) AND THE BUFFER LOCATIO DWRITE    113
C     IS (IN).                                                          DWRITE    114
      CALL MMOVE(SOURCE,IN,AMTDATA)                                     DWRITE    115
```

```
C45700, SUB. DWRITE (UNFORMATTED FORTRAN WRITE OF A COMPLETE LIST)      DWRITE     2
C                                                                       DWRITE     3
C*********************************************************************** DWRITE     4
C                                                                     * DWRITE     5
C***  SUBROUTINE DWRITE (UNIT  ,CORE  ,BYTES)*************************** DWRITE     6
C                                                                     * DWRITE     7
C***  COMPUTER VERSION  ************************************************ DWRITE     8
C     ----------------                                                * DWRITE     9
C     CDC VERSION ONLY.                                               * DWRITE    10
C                                                                     * DWRITE    11
C***  OBJECTIVE  ******************************************************* DWRITE    12
C     ---------                                                       * DWRITE    13
C     CORRESPONDS TO AN UNFORMATTED FORTRAN WRITE STATEMENT OF A      * DWRITE    14
C     COMPLETE LIST.  THE COMPLETE LIST OF DATA IS WRITTEN FROM A     * DWRITE    15
C     CONTINUOUS AREA OF STORAGE AND IS EQUAL TO THE LOGICAL RECORD.  * DWRITE    16
C     ENTRY POINT PRITE CORRESPONDS TO AN UNFORMATTED FORTRAN WRITE   * DWRITE    17
C     STATEMENT OF A PARTIAL LIST.  THE PARTIAL LIST OF DATA IS       * DWRITE    18
C     WRITTEN FROM A CONTINUOUS AREA OF STORAGE AND IS EQUAL TO OR    * DWRITE    19
C     LESS THAN THE LOGICAL RECORD.  COMPLETION OF THE LOGICAL RECORD * DWRITE    20
C     IS INDICATED BY A CALL TO WEND.                                 * DWRITE    21
C                                                                     * DWRITE    22
C***  INPUT/OUTPUT  **************************************************** DWRITE    23
C     ------------                                                    * DWRITE    24
C     INPUT CONSISTS OF THE DATA SET NUMBER AND THE NUMBER OF BYTES   * DWRITE    25
C     WHICH ARE STORED IN THE VARIABLE CORE.  OUTPUT CONSISTS OF      * DWRITE    26
C     STORING THE DATA IN THE VARIABLE CORE ON TO THE DATA SET UNIT.  * DWRITE    27
C                                                                     * DWRITE    28
C***  SUMMARY OF SYMBOLS  ********************************************** DWRITE    29
C     ------------------                                              * DWRITE    30
C.... BYTES ........ INPUT                                            * DWRITE    31
C     NUMBER OF BYTES TO BE MOVED FROM THE VARIABLE CORE AND STORED   * DWRITE    32
C     ON THE DATA SET UNIT.                                           * DWRITE    33
C                                                                     * DWRITE    34
C.... CORE ......... INPUT                                            * DWRITE    35
C     VARIABLE (STORAGE ADDRESS) FROM WHICH DATA IS TO BE TAKEN AND   * DWRITE    36
C     STORED ON THE DATA SET UNIT.                                    * DWRITE    37
C                                                                     * DWRITE    38
C.... UNIT ......... INPUT                                            * DWRITE    39
C     INPUT/OUTPUT DATA SET REFERENCE NUMBER.                         * DWRITE    40
C                                                                     * DWRITE    41
C***  ERROR MESSAGES  ************************************************** DWRITE    42
C     --------------                                                  * DWRITE    43
C     NONE.                                                           * DWRITE    44
C                                                                     * DWRITE    45
C*********************************************************************** DWRITE    46
C                                                                       DWRITE    47
      SUBROUTINE DWRITE(UNIT,CORE,BYTES)                                DWRITE    48
C                                                                       DWRITE    49
      INTEGER UNIT,CORE,BYTES                                           DWRITE    50
      INTEGER SOURCE,COUNT,IN,OUT,FIRST,LIMIT,SPACE                     DWRITE    51
      INTEGER FILENO,AMTDATA                                            DWRITE    52
      INTEGER FILE,FET,BUFFER,BUFSZ,OLDU,OLDOP                          DWRITE    53
      LOGICAL OPEN                                                      DWRITE    54
C                                                                       DWRITE    55
      DIMENSION BUFFER(513,1),BUFSZ(1)                                  DWRITE    56
      DIMENSION FET(54,1)                                               DWRITE    57
C                                                                       DWRITE    58
```

```
VARIABLES      SN  TYPE            RELOCATION
  161  A           REAL                          REFS       33   DEFINED     13
    0  FET         INTEGER    ARRAY     F.P.     REFS        9        11     28     31     32     33
                                              DEFINED        1        21     24     27
  166  LF          INTEGER                       REFS       32   DEFINED     30
  163  LOC         INTEGER                       REFS       21        24     26     27     28     31     32
                                                   33  DEFINED        20     23     25
  165  LU          INTEGER                       REFS       31   DEFINED     29
    0  MAXLOCS     INTEGER              F.P.     REFS       11        25  DEFINED      1
    0  MAXUNTS     INTEGER              F.P.     REFS       11        19  DEFINED      1
  164  NF          INTEGER                       REFS       30   DEFINED     26
  167  NOS         INTEGER    ARRAY              REFS       11        14     15     16     17     31     32
  162  NU          INTEGER                       REFS       21        24     27     28     29     31     32
                                                   33  DEFINED        19

EXTERNALS            TYPE   ARGS       REFERENCES
       MOVE                   5            28       31     32     33
       WORDS                  3            14       15     16     17

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100                       22          20
    0  200                       34          25
    0  1000                      35          19
  146  2000    FMT   NO REFS     43
  150  3000    FMT   NO REFS     44

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   22  1000      NU           19 35       52B                EXT REFS   NOT INNER
   27  100       LOC          20 22        2B       INSTACK
   35  200       LOC          25 34       35B                EXT REFS

STATISTICS
  PROGRAM LENGTH                 247B      167
       52000B CM USED
```

```
      SUBROUTINE FETS (FET, MAXLOCS, MAXUNTS)                           FETS     2
C                                                                       FETS     3
C***                                                                    FETS     4
C                                                                       FETS     5
C     CDC VERSION ONLY                                                  FETS     6
C                                                                       FETS     7
C***                                                                    FETS     8
C                                                                       FETS     9
      INTEGER FET                                                       FETS    10
C                                                                       FETS    11
      DIMENSION FET(MAXLOCS,MAXUNTS),NOS(16)                            FETS    12
C                                                                       FETS    13
      A=1HA                                                             FETS    14
      CALL WORDS (NOS(1), 4,40H0102030405060708091011121314151617181920) FETS   15
      CALL WORDS (NOS(5), 4,40H2122232425262728293031323334353637383940) FETS   16
      CALL WORDS (NOS(9), 4,40H4142434445464748495051525354555657585960) FETS   17
      CALL WORDS(NOS(13), 4,40H6162636465666768697071727374757677787980) FETS   18
C                                                                       FETS    19
      DO 1000 NU=1,MAXUNTS                                              FETS    20
      DO 100 LOC=1,13                                                   FETS    21
      FET(LOC,NU) =  0                                                  FETS    22
  100 CONTINUE                                                          FETS    23
      LOC     =  14                                                     FETS    24
      FET(LOC,NU) =  1                                                  FETS    25
      DO 200 LOC=15,MAXLOCS                                             FETS    26
      NF      =  LOC - 14                                               FETS    27
      FET(LOC,NU) =  0                                                  FETS    28
      CALL MOVE (2, 2HFL, 1, FET(LOC,NU), 1)                            FETS    29
      LU      =  2*NU - 1                                               FETS    30
      LF      =  2*NF - 1                                               FETS    31
      CALL MOVE (2, NOS ,LU, FET(LOC,NU), 3)                            FETS    32
      CALL MOVE (2, NOS ,LF, FET(LOC,NU), 5)                            FETS    33
      CALL MOVE(1,A,1,FET(LOC,NU),7)                                    FETS    34
  200 CONTINUE                                                          FETS    35
 1000 CONTINUE                                                          FETS    36
C     WRITE (6,2000) ((FET(LOC,NU), LOC=1,14), NU=1,MAXUNTS)            FETS    37
C     DO 1500 NU=1,MAXUNTS                                              FETS    38
C     WRITE (6,3000)  (FET(LOC,NU), LOC=15,MAXLOCS)                     FETS    39
C1500 CONTINUE                                                          FETS    40
C                                                                       FETS    41
      RETURN                                                            FETS    42
C                                                                       FETS    43
 2000 FORMAT (10X, 14I2)                                                FETS    44
 3000 FORMAT (10X, 10A10)                                               FETS    45
C                                                                       FETS    46
      END                                                               FETS    47
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 FETS	1	41

```
C45700B. UCHECK (CHECK I/O OPERATIONS AND PRINT ERROR MESSAGE)         UCHECK    2
C                                                                      UCHECK    3
C********************************************************************* UCHECK    4
C                                                                    * UCHECK    5
C***  SUBROUTINE UCHECK (UNIT  ,L) ********************************** UCHECK    6
C                                                                    * UCHECK    7
C***  COMPUTER VERSION  ********************************************** UCHECK    8
C     ----------------                                               * UCHECK    9
C     CDC VERSION ONLY.                                              * UCHECK   10
C                                                                    * UCHECK   11
C***  OBJECTIVE  ***************************************************** UCHECK   12
C     ---------                                                      * UCHECK   13
C     DOES VARIOUS CHECKS ON THE DATA SET UNIT (SEE ERROR MESSAGES    * UCHECK   14
C     BELOW).  IF ERRORS OCCUR, CALCULATIONS ARE TERMINATED.         * UCHECK   15
C                                                                    * UCHECK   16
C***  INPUT/OUTPUT  ************************************************** UCHECK   17
C     ------------                                                   * UCHECK   18
C     BASED UPON THE VALUE OF THE DATA SET UNIT, VARIOUS ERROR MESSAGES* UCHECK   19
C     MAY BE WRITTEN.                                                * UCHECK   20
C                                                                    * UCHECK   21
C***  SUMMARY OF SYMBOLS  ******************************************** UCHECK   22
C     ------------------                                             * UCHECK   23
C.... L ............ INPUT                                           * UCHECK   24
C     FOR THE VARIOUS MEANINGS OF THIS VARIABLE, SEE THE CALLS        * UCHECK   25
C     TO THE ENTRY POINTS OF SUBROUTINE UCHECK.                      * UCHECK   26
C                                                                    * UCHECK   27
C.... UNIT ......... INPUT                                           * UCHECK   28
C     INPUT/OUTPUT DATA SET REFERENCE NUMBER.                        * UCHECK   29
C     FOR ADDITIONAL MEANINGS OF THIS VARIABLE, SEE THE CALLS        * UCHECK   30
C     TO THE ENTRY POINTS OF SUBROUTINE UCHECK.                      * UCHECK   31
C                                                                    * UCHECK   32
C***  ERROR MESSAGES  ************************************************ UCHECK   33
C     --------------                                                 * UCHECK   34
C     --- IS A BAD UNIT NUMBER.                                      * UCHECK   35
C     --- IS A BAD FILE NUMBER.                                      * UCHECK   36
C     ATTEMPT TO READ OR WRITE FROM LOCATIONS ------ THRU ------ NO  * UCHECK   37
C     GOOD.                                                          * UCHECK   38
C     BUFFER TOO SMALL FOR FILE -------                              * UCHECK   39
C     ATTEMPT TO READ AFTER WRITE FILE -------.                      * UCHECK   40
C     END OF INFORMATION FILE -------.                               * UCHECK   41
C     ERROR, FILE ------- ,CODE AND STATUS= ------.                  * UCHECK   42
C                                                                    * UCHECK   43
C********************************************************************* UCHECK   44
C                                                                      UCHECK   45
      SUBROUTINE UCHECK(UNIT,L)                                        UCHECK   46
C                                                                      UCHECK   47
      INTEGER BUFFER,BUFSZ,CM,FET,FL,OLDOP,OLDU,UNIT                   UCHECK   48
C                                                                      UCHECK   49
      DIMENSION BUFFER(513,1),BUFSZ(1)                                 UCHECK   50
      DIMENSION FET(54,1)                                              UCHECK   51
      DIMENSION ITAPES(1)                                              UCHECK   52
      DIMENSION MSG(13)                                                UCHECK   53
C                                                                      UCHECK   54
      COMMON /CTAPES/ ITAPES                                           UCHECK   55
      COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ                 UCHECK   56
      COMMON /DCOM2 / FET                                              UCHECK   57
      COMMON /DCOM3 / BUFFER                                           UCHECK   58
```

```
      C                                                               UCHECK   59
      C                                                               UCHECK   60
      C INITIAL CONDITIONS                                            UCHECK   61
            DATA MSG/13*0/                                            UCHECK   62
            DATA CM/400000B/                                          UCHECK   63
            ITAPEW = ITAPES(6)                                        UCHECK   64
      C                                                               UCHECK   65
            IF (UNIT.GT.0.AND.UNIT.LE.MAXUNTS) RETURN                 UCHECK   66
            ENCODE(120,10,MSG) UNIT                                   UCHECK   67
            GO TO 1000                                                UCHECK   68
      C                                                               UCHECK   69
            ENTRY FCHECK                                              UCHECK   70
            IF (UNIT.GT.0.AND.UNIT.LE.MAXFILS) RETURN                 UCHECK   71
            ENCODE(120,20,MSG) UNIT                                   UCHECK   72
            GO TO 1000                                                UCHECK   73
      C                                                               UCHECK   74
            ENTRY SCHECK                                              UCHECK   75
            L1=UNIT                                                   UCHECK   76
            L2=L1+L                                                   UCHECK   77
            LL=LOCF(L2)                                               UCHECK   78
      C     IF(CM.EQ.0) CM=FL(0)                                      UCHECK   79
            IF (L1.LE.L2.AND.(L1.GT.LL.OR.L2.LT.LL).AND.L2.LE.CM) RETURN  UCHECK   80
            ENCODE(120,30,MSG) L1,L2                                  UCHECK   81
            GO TO 1000                                                UCHECK   82
      C                                                               UCHECK   83
            ENTRY MERR1                                               UCHECK   84
            ENCODE (120,40,MSG) FET(1,UNIT)                           UCHECK   85
            GO TO 1000                                                UCHECK   86
      C                                                               UCHECK   87
            ENTRY MERR2                                               UCHECK   88
            ENCODE(120,50,MSG) FET(1,UNIT)                            UCHECK   89
            GO TO 1000                                                UCHECK   90
      C                                                               UCHECK   91
            ENTRY MERR3                                               UCHECK   92
            ENCODE(120,60,MSG) UNIT                                   UCHECK   93
            GO TO 1000                                                UCHECK   94
      C                                                               UCHECK   95
            ENTRY MERR4                                               UCHECK   96
            ENCODE(120,70,MSG) UNIT,UNIT                              UCHECK   97
       1000 WRITE (ITAPEW,1001) (FET(I,UNIT), I=1,18)                 UCHECK   98
            CALL SYSTEM(200,MSG)                                      UCHECK   99
      C                                                               UCHECK  100
      C                                                               UCHECK  101
      C FORMATS                                                       UCHECK  102
         10 FORMAT (I20, 21H IS A BAD UNIT NUMBER )                   UCHECK  103
         20 FORMAT (I20, 21H IS A BAD FILE NUMBER )                   UCHECK  104
         30 FORMAT (44H ATTEMPT TO READ TO OR WRITE FROM LOCATIONS , O6,  UCHECK  105
           16H THRU , O6,  9H, NO GOOD )                              UCHECK  106
         40 FORMAT (27H BUFFER TOO SMALL FOR FILE ,A7)                UCHECK  107
         50 FORMAT (35H ATTEMPT TO READ AFTER WRITE, FILE ,A7)        UCHECK  108
         60 FORMAT (26H END OF INFORMATION, FILE ,A7)                 UCHECK  109
         70 FORMAT (13H ERROR, FILE ,A7,18H, CODE AND STATUS= ,O6)    UCHECK  110
       1001 FORMAT (1X,O20)                                           UCHECK  111
      C                                                               UCHECK  112
            STOP 200                                                  UCHECK  113
            END                                                       UCHECK  114
```

```
        SUBROUTINE UCHECK      74/74    OPT=1                        FTN 4.8+577        85/01/23. 08.10.44        PAGE      3

   CARD NR. SEVERITY  DETAILS     DIAGNOSIS OF PROBLEM

        63      I       ITAPES    ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.



        SYMBOLIC REFERENCE MAP (R=3)

    ENTRY POINTS      DEF LINE     REFERENCES
       15  FCHECK        69          70
       62  MERR1         83
      103  MERR2         87
      124  MERR3         91
      141  MERR4         95
       35  SCHECK        74          79
        3  UCHECK        45          65

    VARIABLES      SN  TYPE          RELOCATION
        0  BUFFER      INTEGER    ARRAY    DCOM3       REFS       47       49       57
        4  BUFSZ       INTEGER    ARRAY    DCOM1       REFS       47       49       55
      172  CM          INTEGER                         REFS       47       79   DEFINED       62
        0  FET         INTEGER    ARRAY    DCOM2       REFS       47       50       56       84       88       97
      320  FL        * INTEGER   *UNDEF                REFS       47
      325  I           INTEGER                         REFS       97   DEFINED      97
        0  ITAPES      INTEGER    ARRAY    CTAPES      REFS       51       54       63
      321  ITAPEW      INTEGER                      DEFINED       63   I/O REFS     97
        0  L           INTEGER              F.P.       REFS       76   DEFINED      45
      324  LL          INTEGER                         REFS     2*79   DEFINED      77
      322  L1          INTEGER                         REFS       76     2*79       80   DEFINED      75
      323  L2          INTEGER                         REFS       77     3*79       80   DEFINED      76
        1  MAXFILS     INTEGER             DCOM1       REFS       55       70
        0  MAXUNTS     INTEGER             DCOM1       REFS       55       65
      326  MSG         INTEGER    ARRAY                REFS       52       98   DEFINED       61       66       71       80
                                                         84       88       92       96
        3  OLDOP       INTEGER             DCOM1       REFS       47       55
        2  OLDU        INTEGER             DCOM1       REFS       47       55
        0  UNIT        INTEGER              F.P.       REFS       47     2*65       66     2*70       71       75       84
                                                         88       92     2*96       97   DEFINED      45
        VARIABLES USED AS FILE NAMES, SEE ABOVE

    EXTERNALS          TYPE    ARGS        REFERENCES
           SYSTEM               2              98

    INLINE FUNCTIONS   TYPE    ARGS       DEF LINE   REFERENCES
           LOCF      INTEGER    1  INTRIN                77

    STATEMENT LABELS               DEF LINE   REFERENCES
      245   10        FMT             102         66
      251   20        FMT             103         71
      255   30        FMT             104         80
      266   40        FMT             106         84
      273   50        FMT             107         88
      301   60        FMT             108         92
      306   70        FMT             109         96
      155   1000                       97         67       72       81       85       89       93
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  314  1001    FMT              110         97

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES        1                 0 ITAPES (1)
       DCOM1         5                 0 MAXUNTS(1)             1 MAXFILS(1)             2 OLDU    (1)
                                       3 OLDOP   (1)            4 BUFSZ  (1)
       DCOM2        54                 0 FET     (54)
       DCOM3       513                 0 BUFFER (513)

STATISTICS
  PROGRAM LENGTH                 345B      229
  CM LABELED COMMON LENGTH      1075B      573
         52000B CM USED
```

```
C PROGRAM MYIO                                                           MYIO       2
C*                                                                       MYIO       3
C*********************************************************************** MYIO       4
C*                                                                     * MYIO       5
C***   SUBROUTINE MYIO     ******************************************** MYIO       6
C*                                                                     * MYIO       7
C***   COMPUTER VERSION  ********************************************** MYIO       8
C*     ----------------                                                * MYIO       9
C*     CDC ONLY.                                                       * MYIO      10
C*                                                                     * MYIO      11
C***   OBJECTIVE  **************************************************** MYIO      12
C*     ---------                                                       * MYIO      13
C*     ENTRY POINT REND TERMINATES PROCESSING OF THE LOGICAL RECORD FOR * MYIO      14
C*     AN UNFORMATTED FORTRAN READ OF A PARTIAL LIST /USED WITH PREAD). * MYIO      15
C*     ENTRY POINT WEND TERMINATES PROCESSING OF THE LOGICAL RECORD FOR * MYIO      16
C*     AN UNFORMATTED FORTRAN WRITE OF A PARTIAL LIST (USED WITH PRITE).* MYIO      17
C*                                                                     * MYIO      18
C***   INPUT/OUTPUT  ************************************************* MYIO      19
C*     ------------                                                    * MYIO      20
C*                                                                     * MYIO      21
C**** SUMMARY OF SYMBOLS  ******************************************** MYIO      22
C*     ------------------                                              * MYIO      23
C*                                                                     * MYIO      24
C***   ERROR MESSAGES  *********************************************** MYIO      25
C*     --------------                                                  * MYIO      26
C*     NONE.                                                           * MYIO      27
C*                                                                     * MYIO      28
C*********************************************************************** MYIO      29
C*                                                                       MYIO      30
CIBM                                                                     MYIO      31
C     SUBROUTINE MYIO                                                    MYIO      32
CIBM                                                                     MYIO      33
```

```
MYIO
STORAGE ALLOCATION.

        ADDRESS   LENGTH          BINARY CONTROL CARDS.

              0       64          IDENT     MYIO
             64                   END

                              ENTRY POINTS.

                              MOPEN          0+       MSKIP        20+       MRECALL      40+
                              MCLOSE         4+       MREWIND      24+       REND         44+
                              MEVICT        10+       MREAD        30+       WEND         44+
                              MEND          14+       MWRITE       34+       OWNCODE      46+

                              EXTERNAL SYMBOLS.

                              CPC      MERR3     MERR4


                                       IDENT     MYIO                                   MYIO      34
                                       LIST      M                                      MYIO      35
                                       EXT       CPC                                    MYIO      36
                                       MACRO     M,NAME,CODE                            MYIO      37
                                       ENTRY     NAME                                   MYIO      38
                              NAME     BSS       1                                      MYIO      39
                                       SA1       X1                                     MYIO      40
                                       RJ        CPC                                    MYIO      41
                              +        VFD       18D/3,2/1,40D/CODE                     MYIO      42
                                       JP        *-3                                    MYIO      43
                                       ENDM                                             MYIO      44
                         D_0           BASE      0                                      MYIO      45
   0                          MOPEN    M         160                                    MYIO      46
                                       ENTRY     MOPEN                                 M        .1
   0                       1  MOPEN     BSS       1                                    M        .1
   1  53110                            SA1       X1                                    M        .1
           0100000000 X                RJ        CPC                                   M        .1
   2  00000320000000000160    +        VFD       18D/3,2/1,40D/160                     M        .1
   3  0200000000 +                     JP        *-3                                   M        .1
                                       ENDM                                            M        .1
                              MCLOSE   M         150                                     MYIO      47
                                       ENTRY     MCLOSE                                M        .1
   4                       1  MCLOSE    BSS       1                                    M        .1
   5  53110                            SA1       X1                                    M        .1
           0100000000 X                RJ        CPC                                   M        .1
   6  00000320000000000150    +        VFD       18D/3,2/1,40D/150                     M        .1
   7  0200000004 +                     JP        *-3                                   M        .1
                                       ENDM                                            M        .1
                              MEVICT   M         114                                     MYIO      48
                                       ENTRY     MEVICT                                M        .1
  10                       1  MEVICT    BSS       1                                    M        .1
  11  53110                            SA1       X1                                    M        .1
           0100000000 X                RJ        CPC                                   M        .1
  12  00000320000000000114    +        VFD       18D/3,2/1,40D/114                     M        .1
  13  0200000010 +                     JP        *-3                                   M        .1
                                       ENDM
```

```
                                      MEND      M          34                                            MYIO        49
                                                ENTRY      MEND                                          M      .1
 14                              1    MEND      BSS        1                                             M      .1
 15  53110                                      SA1        X1                                            M      .1
        0100000000 X                            RJ         CPC                                           M      .1
 16  00000320000000000034        +              VFD        18D/3,2/1,40D/34                              M      .1
 17  0200000014 +                               JP         *-3                                           M      .1
                                                ENDM                                                     M      .1
                                      MSKIP     M          240                                           MYIO        50
                                                ENTRY      MSKIP                                         M      .1
 20                              1    MSKIP     BSS        1                                             M      .1
 21  53110                                      SA1        X1                                            M      .1
        0100000000 X                            RJ         CPC                                           M      .1
 22  00000320000000000240        +              VFD        18D/3,2/1,40D/240                             M      .1
 23  0200000020 +                               JP         *-3                                           M      .1
                                                ENDM                                                     M      .1
                                      MREWIND   M          50                                            MYIO        51
                                                ENTRY      MREWIND                                       M      .1
 24                              1    MREWIND      BSS        1                                          M      .1
 25  53110                                      SA1        X1                                            M      .1
        0100000000 X                            RJ         CPC                                           M      .1
 26  C0000320000000000050        +              VFD        18D/3,2/1,40D/50                              M      .1
 27  0200000024 +                               JP         *-3                                           M      .1
                                                ENDM                                                     M      .1
                                                ENTRY      MREAD,MWRITE                                  MYIO        52
 30                              1    MREAD     BSS        1                                             MYIO        53
 31  53110                                      SA1        X1                                            MYIO        54
        0100000000 X             -              RJ         CPC                                           MYIO        55
 32  00000220000000000010                       VFD        18D/2,2/1,40D/10B                             MYIO        56
 33  0200000030 +                               JP         MREAD                                         MYIO        57
 34                              1    MWRITE    BSS        1                                             MYIO        58
 35  53110                                      SA1        X1                                            MYIO        59
        0100000000 X             -              RJ         CPC                                           MYIO        60
 36  00000220000000000014                       VFD        18D/2,2/1,40D/14B                             MYIO        61
 37  0200000034 +                               JP         MWRITE                                        MYIO        62
                                                ENTRY      MRECALL                                       MYIO        63
 40                              1    MRECALL   BSS        1                                             MYIO        64
 41  53110                                      SA1        X1                                            MYIO        65
        0100000000 X             -              RJ         CPC                                           MYIO        66
 42  )0000120000000777777        +              VFD        18D/1,2/1,40D/777777B                         MYIO        67
 43  0200000040 +                               JP         MRECALL                                       MYIO        68
                                                ENTRY      REND,WEND                                     MYIO        69
 44                                   WEND      BSS        0                                             MYIO        70
 44                              1    REND      BSS        1                                             MYIO        71
 45  0200000044 +                               JP         *-1                                           MYIO        72
                                                ENTRY      OWNCODE                                       MYIO        73
 46                              1    OWNCODE   BSS        1                                             MYIO        74
 47  5110000051 +                               SA1        ADDRS                                         MYIO        75
            10611                               BX6        X1                                            MYIO        76
 50  0200000046 +                               JP         OWNCODE                                       MYIO        77
 51  0000000052 +                     ADDRS     VFD        30D/EOI,30D/ERR                               MYIO        78
            0000000060 +
                                                EXT        MERR3,MERR4                                   MYIO        79
 52                              1    EOI       BSS        1                                             MYIO        80
 53  10611                                      BX6        X1                                            MYIO        81
        5160000056 +                            SA6        WORD                                          MYIO        82
 54  5110000057 +                               SA1        WDADDR                                        MYIO        83
```

```
             0100000000 X          RJ       MERR3                                        MYIO     84
   55  0200000052 +                JP       EOI                                          MYIO     85
   56                   1   WORD   BSS      1                                            MYIO     86
   57  00000000000000000056 + WDADDR VFD    60D/WORD                                     MYIO     87
   60                   1   ERR    BSS      1                                            MYIO     88
   61  10611                       BX6      X1                                           MYIO     89
            5160000056 +           SA6      WORD                                         MYIO     90
   62  5110000057 +                SA1      WDADDR                                       MYIO     91
             0100000000 X          RJ       MERR4                                        MYIO     92
   63  0200000060 +                JP       ERR                                          MYIO     93
   64                              END                                                   MYIO     94

                  46300B CM  STORAGE USED          103 STATEMENTS      20 SYMBOLS
                   PARALLEL CPU ASSEMBLY         0.261 SECONDS         57 REFERENCES


SYMBOLIC REFERENCE TABLE.

ADDRS        51   PROGRAM*      2/48     2/51 L
CPC           0   EXTERNAL*     1/24 X   1/46     2/05     2/21     2/33
                                1/38     1/54     2/13     2/28     2/39
EOI          52   PROGRAM*      2/51     2/54 L   3/02
ERR          60   PROGRAM*      2/51     3/05 L   3/10
MCLOSE        4   PROGRAM*      1/43 E   1/44 L
MEND         14   PROGRAM*      2/02 E   2/03 L
MERR3         0   EXTERNAL*     2/53 X   3/01
MERR4         0   EXTERNAL*     2/53 X   3/09
MEVICT       10   PROGRAM*      1/51 E   1/52 L
MOPEN         0   PROGRAM*      1/35 E   1/36 L
MREAD        30   PROGRAM*      2/25 E   2/26 L   2/30
MRECALL      40   PROGRAM*      2/36 E   2/37 L   2/41
MREWIND      24   PROGRAM*      2/18 E   2/19 L
MSKIP        20   PROGRAM*      2/10 E   2/11 L
MWRITE       34   PROGRAM*      2/25 E   2/31 L   2/35
OWNCODE      46   PROGRAM*      2/46 E   2/47 L   2/50
REND         44   PROGRAM*      2/42 E   2/44 L
WDADDR       57   PROGRAM*      2/57     3/04 L   3/08
WEND         44   PROGRAM*      2/42 E   2/43 L
WORD         56   PROGRAM*      2/56 S   3/03 L   3/04     3/07 S
```

```
C PROGRAM MMOVE                                                         MMOVE     2
C*                                                                      MMOVE     3
C********************************************************************** MMOVE     4
C*                                                                    * MMOVE     5
C***   SUBROUTINE MMOVE    ******************************************** MMOVE     6
C*                                                                    * MMOVE     7
C***   COMPUTER VERSION  ********************************************** MMOVE     8
C*     ----------------                                               * MMOVE     9
C*     CDC ONLY.                                                      * MMOVE    10
C*                                                                    * MMOVE    11
C***   OBJECTIVE  ***************************************************** MMOVE    12
C*     ---------                                                      * MMOVE    13
C*                                                                    * MMOVE    14
C***   INPUT/OUTPUT  ************************************************** MMOVE    15
C*     ------------                                                   * MMOVE    16
C*                                                                    * MMOVE    17
C***   SUMMARY OF SYMBOLS  ******************************************** MMOVE    18
C*     ------------------                                             * MMOVE    19
C*                                                                    * MMOVE    20
C***   ERROR MESSAGES  ************************************************ MMOVE    21
C*     --------------                                                 * MMOVE    22
C*     NONE.                                                          * MMOVE    23
C*                                                                    * MMOVE    24
C********************************************************************** MMOVE    25
C*                                                                      MMOVE    26
CIBM                                                                    MMOVE    27
C      SUBROUTINE MMOVE                                                 MMOVE    28
CIBM                                                                    MMOVE    29
```

```
STORAGE ALLOCATION

        ADDRESS   LENGTH               BINARY CONTROL CARDS.

             0        15               IDENT      MMOVE
            15                         END


                                 ENTRY POINTS.

                                 MMOVE             0+



                                       IDENT      MMOVE                                                MMOVE
                                       ENTRY      MMOVE                                                MMOVE
    0                          1 MMOVE BSS        1                                                    MMOVE
    1  53210                           SA2        X1                                                   MMOVE
            63120                      SB1        X2                                                   MMOVE
                 5011000001            SA1        A1+1                                                 MMOVE
    2  53210                           SA2        X1                                                   MMOVE
            63320                      SB3        X2                                                   MMOVE
                 5011000001            SA1        A1+1                                                 MMOVE
    3  53210                           SA2        X1                                                   MMOVE
            0302000000 +               ZR         X2,MMOVE                                             MMOVE
    4  0332000000 +                    NG         X2,MMOVE                                             MMOVE
                 63221                 SB2        X2+B1                                                MMOVE
    5  6122777776                      SB2        B2-1                                                 MMOVE
                 63423                 SB4        X2+B3                                                MMOVE
    6  6144777776                      SB4        B4-1                                                 MMOVE
                 6252777776            SB5        X2-1                                                 MMOVE
    7  76250                           SX2        B5                                                   MMOVE
            21201                      AX2        1                                                    MMOVE
                 63521                 SB5        X2+B1                                                MMOVE
                      56110            SA1        B1                                                   MMOVE
   10  10611                           BX6        X1                                                   MMOVE
            56630                      SA6        B3                                                   MMOVE
                 0412000000 +          EQ         B1,B2,MMOVE                                          MMOVE
   11  56220                     LOOP  SA2        B2                                                   MMOVE
            5011000001                 SA1        A1+1                                                 MMOVE
                      10722            BX7        X2                                                   MMOVE
   12  6122777776                      SB2        B2-1                                                 MMOVE
                 56740                 SA7        B4                                                   MMOVE
                      10611            BX6        X1                                                   MMOVE
   13  6144777776                      SB4        B4-1                                                 MMOVE
                 5066000001            SA6        A6+1                                                 MMOVE
   14  0552000011 +                    NE         B5,B2,LOOP                                           MMOVE
                 0200000000 +          JP         MMOVE                                                MMOVE
   15                                  END                                                             MMOVE

               46300B CM  STORAGE USED           35 STATEMENTS       2 SYMBOLS
                 PARALLEL CPU ASSEMBLY         0.105 SECONDS         8 REFERENCES


SYMBOLIC REFERENCE TABLE.

LOOP          11   PROGRAM*        1/38 L     1/46
```

```
MMOVE          0   PROGRAM*      1/15 E    1/16 L    1/24      1/25      1/37      1/47
```

```
          C45700. SUB. DVOLNO (VOLUME SERIAL NUMBER FOR DSIO)             DVOLNO      2
                SUBROUTINE DVOLNO (ITAPE,REELNO)                          DVOLNO      3
          C                                                               DVOLNO      4
                DATA  REELN / 10H          /                              DVOLNO      5
                REELNO = REELN                                            DVOLNO      6
          C                                                               DVOLNO      7
                RETURN                                                    DVOLNO      8
                END                                                       DVOLNO      9
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  DVOLNO        2           7

VARIABLES      SN  TYPE          RELOCATION
    O  ITAPE       INTEGER   *UNUSED    F.P.     DEFINED      2
    7  REELN       REAL                            REFS       5     DEFINED      4
    O  REELNO      REAL                 F.P.     DEFINED      2         5

STATISTICS
  PROGRAM LENGTH                    10B        8
        52000B CM USED
```

```
  1          C45700, SUB. ABDUMP (ABEND DUMP)                                              ABDUMP      2
                   SUBROUTINE ABDUMP                                                       ABDUMP      3
             C                                                                             ABDUMP      4
                   ZERO = 0.0                                                              ABDUMP      5
  5                DUMP = 1.0/ZERO                                                         ABDUMP      6
             C                                                                             ABDUMP      7
                   RETURN                                                                  ABDUMP      8
                   END                                                                     ABDUMP      9


       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    1  ABDUMP         2           7

VARIABLES     SN  TYPE            RELOCATION
    7  DUMP    *  REAL                            DEFINED       5
    6  ZERO       REAL                              REFS        5    DEFINED       4

STATISTICS
  PROGRAM LENGTH                  10B       8
         52000B CM USED
```

```
              SUBROUTINE STRDES                                                 STRDES     2
              COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    STRDES     3
             A     ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)            STRDES     4
             B     ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                 STRDES     5
             C     ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                 STRDES     6
             D     ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                         STRDES     7
             E     ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                            STRDES     8
             F     ,STRFDO(5,6),STRFDN(5,6)                                     STRDES     9
              COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD      STRDES    10
              COMMON/POWELL/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)    STRDES    11
             1             ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICONV,ICN   STRDES    12
              COMMON/CTAPES/ ITAPES                                             STRDES    13
              COMMON /MAX/ MAXDIM                                               STRDES    14
              COMMON/ VSAVE / VNSAVE, VOSAVE                                    STRDES    15
              COMMON/NEWCON/JNEW(50),NEWDIM                                     STRDES    16
              COMMON /JGL/ JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50),         STRDES    17
             1             MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,              STRDES    18
             2             NOTACT(50),NDIM                                      STRDES    19
         C                                                                      STRDES    20
         CCDC                                                                   STRDES    21
              COMMON /INCCOM/ GECS(35,50),BCOECS(50),NPMECS,MSTRECS             STRDES    22
              COMMON /STRCOM/ JSETECS(50),JDIMECS,LMKECS(50,50),NOTJECS(50),    STRDES    23
             1        NTDMECS,LNDECS(50),LDMECS,NOTTECS(50),ICNECS,NDIMECS,     STRDES    24
             2        XOECS(35),XNECS(35),DELXECS(35),GROECS(35),GRNECS(35),    STRDES    25
             3        DELGECS(35),ZECS(35),HOECS(35,35),HNECS(35,35),HGRECS(35), STRDES    26
             4        ICNVECS                                                   STRDES    27
              COMMON /KLUES/ IDUM1(16),NCYC,IDUM2(7)                            STRDES    28
         CCDC                                                                   STRDES    29
         C                                                                      STRDES    30
              DIMENSION VAR(4)                                                  STRDES    31
              DIMENSION A(35),B(35),IPERM(35),ITAPES(50)                        STRDES    32
              DIMENSION TYPE(14)                                                STRDES    33
              DIMENSION XNEW(13),GNEW(13)                                       STRDES    34
         C                                                                      STRDES    35
         CCDC                                                                   STRDES    36
              LEVEL 3, JSETECS,JDIMECS,GECS,LMKECS,BCOECS,MSTRECS,NOTJECS,      STRDES    37
             1         NTDMECS,LNDECS,LDMECS,NOTTECS,NDIMECS,XOECS,XNECS,       STRDES    38
             2         DELXECS,GROECS,GRNECS,DELGECS,ZECS,HOECS,HNECS,HGRECS,   STRDES    39
             3         NPMECS,ICNVECS,ICNECS                                    STRDES    40
         CCDC                                                                   STRDES    41
         C                                                                      STRDES    42
              DATA VAR /4HW   ,4HIXX ,4HIYY ,4HIZZ /                            STRDES    43
              DATA TYPE /4HPARA,4H   W,4H  IX,4H  IY,4H  IZ,                    STRDES    44
             A           4H  RX,4H  RY,4H  RZ,4H  FX,4H  FY,4H  FZ,             STRDES    45
             B           4H FXX,4H FYY,4H FZZ /                                 STRDES    46
         C                                                                      STRDES    47
              ITAPEW = ITAPES(6)                                                STRDES    48
              ITAPEN = ITAPES(40)                                               STRDES    49
         C                                                                      STRDES    50
         CIBM                                                                   STRDES    51
         C    ITAPUP = 60                                                       STRDES    52
         CIBM                                                                   STRDES    53
         C                                                                      STRDES    54
              MAXDIM = 35                                                       STRDES    55
              CALL MESAGE(1,6,6HSTRDES)                                         STRDES    56
              ISTEP2 = IABS(ISTEP)                                              STRDES    57
              WRITE(ITAPEW,390)  ISTEP2                                         STRDES    58
```

```
      C                                                            RILL    116
      C      DO 9 J= 1,NPARM                                       RILL    117
      C    9 X0(J)= XJ(J,NOS)                                      RILL    118
      C      GO TO 5                                               RILL    119
      C    7 CONTINUE                                              RILL    120
      C                                                            RILL    121
      C SINCE NEW PT IS NOT A REPEAT,                              RILL    122
      C MAKE MOVE                                                  RILL    123
      C                                                            RILL    124
      C      WRITE(ITAPEW,420) JJ,GRO(JJ)                          RILL    125
      C      WRITE(ITAPEN,420) JJ, GRO(JJ)                         RILL    126
      C      VNEW= VOLD                                            RILL    127
      C      RETURN 1                                              RILL    128
      C                                                            RILL    129
      C NO NON-REPEATED DIRECT SEARCH POSSIBLE                      RILL    130
      C                                                            RILL    131
      C   10 CONTINUE                                              RILL    132
      C      WRITE(ITAPEW,440)                                     RILL    133
      C      WRITE(ITAPEN,440)                                     RILL    134
      C      ICYCLE= -1                                            RILL    135
      C      RETURN 1                                              RILL    136
        400 FORMAT(1HO,15X,33HA LOCAL MINIMUM HAS BEEN DETECTED)   RILL    137
        401 FORMAT(1HO,15X,24HNORM OF PREVIOUS MOVE = ,1PE20.8)    RILL    138
      C 410 FORMAT(1HO,15X,33HA POSSIBLE RILL HAS BEEN DETECTED)   RILL    139
      C 420 FORMAT(1HO,15X,36HMAXIMUM SCALED DERIVATIVE OCCURS FOR, RILL   140
      C    1 13H VARIABLE NO ,I2,8H AND IS ,1PE14.5,///)           RILL    141
      C 440 FORMAT(1HO,10X,25HNO NEW SIDE-STEP POSSIBLE)           RILL    142
      C  ****************************************************      RILL    143
      C  *        END OF CODE THAT HAS BEEN COMMENTED OUT.    *      RILL    144
      C  ****************************************************      RILL    145
             END                                                   RILL    146
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE     REFERENCES
    1  RILL           1

VARIABLES      SN  TYPE          RELOCATION
  166  B           REAL      *UNDEF               REFS       26
    0  CON         REAL       ARRAY    CONS       REFS       24
  257  DELG        REAL       ARRAY    POWELL     REFS       17
  106  DELX        REAL       ARRAY    POWELL     REFS       17
  117  EPS       * REAL                         DEFINED      30
  122  G           REAL                           REFS       40        46        47    DEFINED       39        40
  214  GRN         REAL       ARRAY    POWELL     REFS       17
  151  GRO         REAL       ARRAY    POWELL     REFS       17
 5207  HGR         REAL       ARRAY    POWELL     REFS       17
 2676  HN          REAL       ARRAY    POWELL     REFS       17
  365  HO          REAL       ARRAY    POWELL     REFS       17
  120  I           INTEGER                        REFS     3*32   DEFINED       31
 5254  ICN         INTEGER             POWELL     REFS       17
 5253  ICONV       INTEGER             POWELL     REFS       17
    0  ICYCLE      INTEGER             STRCLU     REFS       16
```

```
C (STORE JUMP-OFF POINT)                                      RILL   59
C                                                             RILL   60
C   2 CONTINUE                                                RILL   61
C     NDS= NDS + 1                                            RILL   62
C     M4 = 0                                                  RILL   63
C     M3 = M3 + 1                                             RILL   64
C     WRITE(ITAPEW,410)                                       RILL   65
C     WRITE(ITAPEN,410)                                       RILL   66
C     DO 3 I= 1,NPARM                                         RILL   67
C   3 XJ(I,NDS)= XO(I)                                        RILL   68
C                                                             RILL   69
C ORDER COMPONENTS OF GRADIENT                                RILL   70
C TO GIVE LARGEST ABS VALUE FIRST                             RILL   71
C                                                             RILL   72
C     DO 4 I= 1,NPARM                                         RILL   73
C   4 B(I)= ABS(GRN(I))                                       RILL   74
C     N= -NPARM                                               RILL   75
C     CALL AORDER(B,N,IPERM,1)                                RILL   76
C     II= 0                                                   RILL   77
C                                                             RILL   78
C DETERMINE NEXT LARGEST                                      RILL   79
C UNCONSTRAINED COMPONENT                                     RILL   80
C                                                             RILL   81
C   5 II= II+1                                                RILL   82
C     JJ= IPERM(II)                                           RILL   83
C     IF(II .GT. NPARM) GO TO 10                              RILL   84
C     IF(CON(JJ,4) .LT. 0.0) GO TO 5                          RILL   85
C                                                             RILL   86
C DELETE THIS COMPONENT AND THE CONSTRAINED COMPONENTS        RILL   87
C FROM THE GRADIENT TO FORM THE DIRECT SEARCH DIRECTION       RILL   88
C                                                             RILL   89
C     DO 6 I= 1,NPARM                                         RILL   90
C     DELX(I)= 0.                                             RILL   91
C     IF(I .EQ. JJ) GO TO 6                                   RILL   92
C     IF(CON(I,4) .LT. 0.0) GO TO 6                           RILL   93
C     DELX(I)= -GRO(I)                                        RILL   94
C   6 CONTINUE                                                RILL   95
C                                                             RILL   96
C MAKE A DIRECT SEARCH STEP                                   RILL   97
C                                                             RILL   98
C     STEP= 1.0                                               RILL   99
C     CALL USTEP(STEP)                                        RILL  100
C     INDEX= 1                                                RILL  101
C     CALL CONSTR(INDEX)                                      RILL  102
C                                                             RILL  103
C IS NEW POINT A REPEAT OF                                    RILL  104
C ANY PREVIOUS JUMP-OFF POINT                                 RILL  105
C                                                             RILL  106
C     NN= NDS-1                                               RILL  107
C     DO 7 I= 1,NN                                            RILL  108
C     DO 8 J= 1,NPARM                                         RILL  109
C     X= XJ(J,I)                                              RILL  110
C     Y= XJ(I,NDS)                                            RILL  111
C     IF(X .NE. Y) GO TO 7                                    RILL  112
C   8 CONTINUE                                                RILL  113
C                                                             RILL  114
C RESTORE X AND GO BACK FOR ANOTHER DIRECTION                 RILL  115
```

```
      SUBROUTINE RILL                                                   RILL   2
C  ****************************************************                 RILL   3
C  *       THE CALL TO RILL IN STRDES WITH THE            *             RILL   4
C  *       ARGUMENTS IN THE FOLLOWING STATEMENT           *             RILL   5
C  *       IS NOT VALID IN THE CURRENT VERSION            *             RILL   6
C  *       OF ESP.                                        *             RILL   7
C  ****************************************************                 RILL   8
C     SUBROUTINE RILL (STEP,*,*)                                        RILL   9
      COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    RILL  10
     A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)           RILL  11
     B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                RILL  12
     C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                RILL  13
     D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                        RILL  14
     E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                           RILL  15
     F      ,STRFDO(5,6),STRFDN(5,6)                                    RILL  16
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD      RILL  17
      COMMON/POWELL/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)    RILL  18
     1             ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICONV,ICN   RILL  19
      DIMENSION XDEL(35)                                                RILL  20
CIBM                                                                    RILL  21
C     REAL*8 SUM                                                        RILL  22
CIBM                                                                    RILL  23
      COMMON/DIRECT/NDS,XJ(20,15)                                       RILL  24
      COMMON/CONS/CON(20,4)                                             RILL  25
      COMMON/CTAPES/ ITAPES                                             RILL  26
      DIMENSION B(20),IPERM(20),ITAPES(50)                              RILL  27
      ITAPEW = ITAPES(6)                                                RILL  28
      ITAPEN = ITAPES(40)                                               RILL  29
      CALL MESAGE(1,4,4HRILL)                                           RILL  30
      EPS = 1.0E-3                                                      RILL  31
      DO 1 I = 1, NPARM                                                 RILL  32
    1 XDEL(I) = XN(I) - XO(I)                                           RILL  33
CCDC                                                                    RILL  34
      SUM = 0.0                                                         RILL  35
CCDC                                                                    RILL  36
CIBM                                                                    RILL  37
C     SUM = 0.D0                                                        RILL  38
CIBM                                                                    RILL  39
      G = SOSCAP(XDEL,XDEL,SUM,NPARM,1,1,1,1)                           RILL  40
      G = SQRT(G)                                                       RILL  41
C                                                                       RILL  42
C NEAR LOCAL MINIMUM                                                    RILL  43
C                                                                       RILL  44
      WRITE(ITAPEW,400)                                                 RILL  45
      WRITE(ITAPEN,400)                                                 RILL  46
      WRITE(ITAPEW,401) G                                               RILL  47
      WRITE(ITAPEN,401) G                                               RILL  48
      CALL MESAGE(2,4,4HRILL)                                           RILL  49
      STOP                                                              RILL  50
C  ****************************************************                 RILL  51
C  *       THE FOLLOWING LINES OF CODE HAVE BEEN          *             RILL  52
C  *       COMMENTED OUT BECAUSE THEY CANNOT BE           *             RILL  53
C  *       REACHED IN THE CURRENT VERSION OF ESP.         *             RILL  54
C  ****************************************************                 RILL  55
C     RETURN 2                                                          RILL  56
C                                                                       RILL  57
C DIRECT SEARCH TO BE TRIED                                             RILL  58
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                  210 Z       (35)          245 HO      (1225)        1470 HN      (1225)
                                 2695 HGR     (35)         2730 NPARM   (1)           2731 ICONV   (1)
                                 2732 ICN     (1)
       CTAPES       50              0 ITAPES (50)
       MAX           1              0 MAXDIM (1)
       VSAVE         2              0 VNSAVE (1)              1 VOSAVE (1)
       NEWCON       51              0 JNEW    (50)           50 NEWDIM (1)
       JGL        4505              0 JSET    (50)           50 JDIM    (1)             51 G       (1750)
                                 1801 LMK     (2500)       4301 BCOEF   (50)          4351 MSTAR   (1)
                                 4352 NOTJ    (50)         4402 NOTDIM (1)            4403 LINDEP (50)
                                 4453 LODIM   (1)          4454 NOTACT (50)           4504 NDIM    (1)
       INCCOM     1802 ECS          0 GECS    (1750)       1750 BCOECS (50)           1800 NPMECS (1)
                                 1801 MSTRECS(1)
       STRCOM     5436 ECS          0 JSETECS(50)            50 JDIMECS(1)              51 LMKECS (2500)
                                 2551 NOTJECS(50)          2601 NTDMECS(1)            2602 LNDECS (50)
                                 2652 LDMECS (1)           2653 NOTTECS(50)           2703 ICNECS (1)
                                 2704 NDIMECS(1)           2705 XOECS   (35)          2740 XNECS   (35)
                                 2775 DELXECS(35)          2810 GROECS  (35)          2845 GRNECS (35)
                                 2880 DELGECS(35)          2915 ZECS    (35)          2950 HOECS   (1225)
                                 4175 HNECS   (1225)       5400 HGRECS (35)           5435 ICNVECS(1)
       KLUES        24              0 IDUM1   (16)           16 NCYC    (1)             17 IDUM2   (7)

STATISTICS
  PROGRAM LENGTH                 2204B     1156
  CM LABELED COMMON LENGTH      17231B     7833
  ECS LABELED COMMON LENGTH     16106B     7238
          52000B CM USED
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  113  25                         101        75
  342  75                         196       129
  224  80                         154       143       148       150
  352  100                        204       160
    0  101        INACTIVE        208
  144  105                        134       126       127
 1465  300      FMT  NO REFS      332
 1474  301      FMT               333       203
 1500  390      FMT               334        57        58
 1507  391      FMT               335       118       119
 1517  392      FMT               337       137       138
 1533  393      FMT               339       197       198
 1542  394      FMT  NO REFS      340
 1553  395      FMT               342       158       159       181       183       185       258
 1556  400      FMT               343       156       157       180
 1563  401      FMT               344       259
 1571  402      FMT               345       260
 1621  403      FMT  NO REFS      351
 1627  404      FMT  NO REFS      352
 1643  405      FMT               354       284       285
 1656  406      FMT               356       293       294
 1660  407      FMT               357       167       168
 1575  409      FMT               346       261
 1577  410      FMT               347       262       263       264       265       266       267       268       269       270
                                            271       272       273       274
 1602  411      FMT               348       182
 1607  412      FMT               349       184
 1614  413      FMT               350       257
 1670  9000     FMT               359       144       145
 1676  9001     FMT               360       146       147       152       153

LOOPS  LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
  154  80        I       143 154     55B                EXT REFS  NOT INNER
  201  80        J       148 154     26B                EXT REFS
  336  3         I       194 195      3B      INSTACK
  356  11        I       213 248    116B                EXT REFS  NOT INNER
  400  13        J       220 228     13B       OPT
  426  14        J       229 236     10B       OPT
  451  15        J       237 244     10B       OPT
  515            I       260 260      4B                EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       STORES      457              0 NUMSTR (1)            1 KCONST (1)            2 ISTDOF (30)
                                   32 IDYDOF (30)          62 IDSTR  (5)           67 STRWI  (5)
                                   72 STRWO  (5)           77 STRWN  (5)           82 STRII  (15)
                                   97 STRIO  (15)         112 STRIN  (15)         127 STRRI  (15)
                                  142 STRRO  (15)         157 STRRN  (15)         172 STRWDO (5)
                                  177 STRWDN (5)          182 STRIDO (15)         197 STRIDN (15)
                                  212 STRRDO (15)         227 STRRDN (15)         242 SCALE  (65)
                                  307 STRFI  (30)         337 STRFO  (30)         367 STRFN  (30)
                                  397 STRFDO (30)         427 STRFDN (30)
       STRCLU       10              0 ICYCLE (1)            1 ISTEP  (1)            2 M1     (1)
                                    3 M2     (1)            4 M3     (1)            5 M4     (1)
                                    6 VS     (1)            7 VOLD   (1)            8 VNEW   (1)
                                    9 STPOLD (1)
       POWELL     2733              0 XO     (35)          35 XN     (35)          70 DELX   (35)
                                  105 GRO    (35)         140 GRN    (35)         175 DELG   (35)
```

```
VARIABLES     SN   TYPE           RELOCATION
                                              DEFINED     42
   10  VNEW       REAL               STRCLU      REFS      9      59
 1725  VNOW       REAL                           REFS    246   DEFINED      60
    0  VNSAVE     REAL               VSAVE       REFS     14      60     113
    7  VOLD       REAL               STRCLU      REFS      9
    1  VOSAVE     REAL               VSAVE       REFS     14     113
    6  VS         REAL               STRCLU      REFS      9
 1724  VX         REAL                           REFS    284     285   DEFINED      59
   43  XN         REAL       ARRAY   POWELL      REFS     10      89     185     195     258     317
 5264  XNECS      REAL       ARRAY   STRCOM      REFS     22      36      89     317
 2143  XNEW       REAL       ARRAY               REFS     33     246   DEFINED     219     227     235     243
    0  XO         REAL       ARRAY   POWELL      REFS     10      88     183     316   DEFINED     195
 5221  XOECS      REAL       ARRAY   STRCOM      REFS     22      36      88     316
  322  Z          REAL       ARRAY   POWELL      REFS     10      94     322
 5543  ZECS       REAL       ARRAY   STRCOM      REFS     22      36      94     322

FILE NAMES        MODE
       TAPE39     FMT                  WRITES        246
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE     ARGS        REFERENCES
       CONSTR                  2            202
       LINESR                  1            136
       MESAGE                  3             55     287
       MURT                    1            174
       NRM2                    3            155     175
       READEC                  3             71      72      73      74      76      77      78      79      80
                                             81      82      83      84      85      86      87      88      89
                                             90      91      92      93      94      95      96      97      98
                                             99     100
       RILL                    0            125
       TIMEB                   2            286
       USTEP                   1            205
       VSCALE                  2            108     250
       WRITEC                  3            304     305     306     307     308     309     310     311     312
                                            313     314     315     316     317     318     319     320     321
                                            322     323     324     325     326     327     328

INLINE FUNCTIONS    TYPE     ARGS         DEF LINE   REFERENCES
       ABS        REAL        1  INTRIN                 165
       IABS       INTEGER     1  INTRIN                  56

STATEMENT LABELS             DEF LINE   REFERENCES
    0  1            INACTIVE    113
  252  2                        165       114
    0  3                        195       194
  501  4                        256       278
  633  5                        279       275
  300  6                        179       189
  333  7                        190       186
  471  11                       248       213     245
  365  12                       220       215
  410  13                       228       220     222     223
  433  14                       236       229     231
  456  15                       244       237     239
 1701  16        FMT            361       246
   31  20                        76        70
```

```
VARIABLES       SN  TYPE               RELOCATION
 10463  LINDEP     INTEGER     ARRAY   JGL          REFS        16       84      312
  3411  LMK        INTEGER     ARRAY   JGL          REFS        16       79      307
    63  LMKECS     INTEGER     ARRAY   STRCOM       REFS        22       36       79      307
  5052  LNDECS     INTEGER     ARRAY   STRCOM       REFS        22       36       84      312
  1737  LOOP       INTEGER                          REFS       186      275  DEFINED      178      187      255      276
     0  MAXDIM     INTEGER             MAX          REFS        13  DEFINED       54
 10377  MSTAR      INTEGER             JGL          REFS        16       73       81      309
  3411  MSTRECS    INTEGER             INCCOM       REFS        21       36       73       81      309
     2  M1         INTEGER             STRCLU       REFS         9      115      117      126  DEFINED      115      170
     3  M2         INTEGER             STRCLU       REFS         9      117      125  DEFINED      117      172
     4  M3         INTEGER             STRCLU       REFS         9  DEFINED      173
     5  M4         INTEGER             STRCLU       REFS         9      171      172      173  DEFINED      116      171
    20  NCYC       INTEGER             KLUES        REFS        27       70
 10630  NDIM       INTEGER             JGL          REFS        16       87      315
  5220  NDIMECS    INTEGER             STRCOM       REFS        22       36       87      315
    62  NEWDIM     INTEGER             NEWCON       REFS        15  DEFINED      135
 10546  NOTACT     INTEGER     ARRAY   JGL          REFS        16       86      314
 10462  NOTDIM     INTEGER             JGL          REFS        16       83      311
 10400  NOTJ       INTEGER     ARRAY   JGL          REFS        16       82      310
  4767  NOTJECS    INTEGER     ARRAY   STRCOM       REFS        22       36       82      310
  5135  NOTTECS    INTEGER     ARRAY   STRCOM       REFS        22       36       86      314
  5252  NPARM      INTEGER             POWELL       REFS        10       74       98      155      158      159      175
                                                     181       183      185      194      258      326
  3410  NPMECS     INTEGER             INCCOM       REFS        21       36       74       98      326
  5051  NTDMECS    INTEGER             STRCOM       REFS        22       36       83      311
     0  NUMSTR     INTEGER             STORES       REFS         2      143      213      260      262      263      264
                                                     265       266      267      268      269      270      271      272
                                                     273       274
   362  SCALE      REAL        ARRAY   STORES       REFS         2      215      222      231      239
  1726  STEP       REAL                             REFS       108      128      136      174      202      205      250
                                                     284       285      288  DEFINED      106      128      169
    11  STPOLD     REAL                STRCLU       REFS         9      106  DEFINED      288
   653  STRFDN     REAL        ARRAY   STORES       REFS         2
   615  STRFDO     REAL        ARRAY   STORES       REFS         2
   463  STRFI      REAL        ARRAY   STORES       REFS         2
   557  STRFN      REAL        ARRAY   STORES       REFS         2      243      269      270      271      272      273
                                                     274
   521  STRFO      REAL        ARRAY   STORES       REFS         2
   305  STRIDN     REAL        ARRAY   STORES       REFS         2
   266  STRIDO     REAL        ARRAY   STORES       REFS         2      152      153
   122  STRII      REAL        ARRAY   STORES       REFS         2
   160  STRIN      REAL        ARRAY   STORES       REFS         2      227      263      264      265
   141  STRIO      REAL        ARRAY   STORES       REFS         2
   343  STRRDN     REAL        ARRAY   STORES       REFS         2
   324  STRRDO     REAL        ARRAY   STORES       REFS         2
   177  STRRI      REAL        ARRAY   STORES       REFS         2
   235  STRRN      REAL        ARRAY   STORES       REFS         2      235      266      267      268
   216  STRRO      REAL        ARRAY   STORES       REFS         2
   261  STRWDN     REAL        ARRAY   STORES       REFS         2
   254  STRWDO     REAL        ARRAY   STORES       REFS         2      146      147
   103  STRWI      REAL        ARRAY   STORES       REFS         2
   115  STRWN      REAL        ARRAY   STORES       REFS         2      219      262
   110  STRWO      REAL        ARRAY   STORES       REFS         2
  2125  TYPE       REAL        ARRAY                REFS        32      260      262      263      264      265      266
                                                     267       268      269      270      271      272      273      274
                                                 DEFINED        43
  1750  VAR        REAL        ARRAY                REFS        30      146      147      152      153
```

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VARIABLES       SN  TYPE            RELOCATION
                                               158      159      181      183      185    2*195      215      219
                                               222      227      231      235      239      243      258      260
                                               262      263      264      265      266      267      268      269
                                               270      271      272      273      274   DEFINED     143      158
                                               159      181      183      185      194      213      258      260
                                               262      263      264      265      266      267      268      269
                                               270      271      272      273      274
  5254  ICN          INTEGER             POWELL   REFS       10      100      328  DEFINED      166
  5217  ICNECS       INTEGER             STRCOM   REFS       22       36      100      328
 12473  ICNVECS      INTEGER             STRCOM   REFS       22       36       99      327
  5253  ICONV        INTEGER             POWELL   REFS       10       99      127      327
     0  ICYCLE       INTEGER             STRCLU   REFS        9
    76  IDSTR        INTEGER    ARRAY    STORES   REFS        2      144      145
     0  IDUM1        INTEGER    ARRAY    KLUES    REFS       27
    21  IDUM2        INTEGER    ARRAY    KLUES    REFS       27
    40  IDYDOF       INTEGER    ARRAY    STORES   REFS        2      150
  1727  INDEX        INTEGER                      REFS      108      250  DEFINED      107      249
  2062  IPERM        INTEGER   *UNDEF             REFS       31
  1747  ISAVE     *  INTEGER   *UNDEF             REFS      292
  1746  ISIZE     *  INTEGER                   DEFINED      292
     2  ISTDOF       INTEGER    ARRAY    STORES   REFS        2
     1  ISTEP        INTEGER             STRCLU   REFS        9       56      202      246      289      290
                                               DEFINED      289      290
  1723  ISTEP2       INTEGER                      REFS       57       58  DEFINED       56
  1736  ITAP         INTEGER                   DEFINED      177      188      254      277  I/O REFS     180      181
                                               182      183      184      185      257      258      259      260
                                               261      262      263      264      265      266      267      268
                                               269      270      271      272      273      274
  1722  ITAPEN       INTEGER                      REFS      188      277  DEFINED       48  I/O REFS      58      119
                                               138      145      147      153      157      158      168      198
                                               285      294
     0  ITAPES       INTEGER    ARRAY    CTAPES   REFS       12       31       47       48
  1721  ITAPEW       INTEGER                      REFS      177      254  DEFINED       47  I/O REFS      57      118
                                               137      144      146      152      156      159      167      197
                                               203      284      293
  1745  ITESTN    *  INTEGER   *UNDEF             REFS      291
  1744  ITESTO    *  INTEGER                   DEFINED      291
  1732  J            INTEGER                      REFS      149      151      152      153      221      223      227
                                               230      235      238      243      246   DEFINED      148      220
                                               229      237      246
    62  JDIM         INTEGER             JGL      REFS       16       77      246      305
    62  JDIMECS      INTEGER             STRCOM   REFS       22       36       77      305
  1741  JJ           INTEGER                      REFS      222      231      239  DEFINED      221      230      238
     0  JNEW         INTEGER    ARRAY    NEWCON   REFS       15
     0  JSET         INTEGER    ARRAY    JGL      REFS       16       76      246      304
     0  JSETECS      INTEGER    ARRAY    STRCOM   REFS       22       36       76      304
  1733  K            INTEGER                      REFS      150      152      153      216      218      224      226
                                               232      234      240      242  DEFINED      149      151      212
                                               216      224      232      240
     1  KCONST       INTEGER             STORES   REFS        2      223
  1740  KK           INTEGER                      REFS      217      218      219 [illegible]      226      227      233
                                               234      235      241      242 [illegible]      245
                                               DEFINED      214      217      225      233      241
  1742  K1           INTEGER                      REFS      246  DEFINED      246
  1743  K2           INTEGER                      REFS      246  DEFINED      246
 10545  LDDIM        INTEGER             JGL      REFS       16       85      313
  5134  LDMECS       INTEGER             STRCOM   REFS       22       36       85      313
```

```
      400 FORMAT(1HO,5X,22HSCALED DERIVATIVES ARE)                             STRDES  344
      401 FORMAT(////,6X,32H***** NEW STORE PARAMETERS *****,/)                STRDES  345
      402 FORMAT(2X,A4,5(10H STORE NO.,I2,1X))                                 STRDES  346
      409 FORMAT(1HO)                                                          STRDES  347
      410 FORMAT(2X,A4,5(1PE12.5,1X))                                          STRDES  348
      411 FORMAT(1HO,5X,29HPREVIOUS SCALED VARIABLES ARE )                     STRDES  349
      412 FORMAT(1HO,5X,28HPRESENT SCALED VARIABLES ARE  )                     STRDES  350
      413 FORMAT(1H1,5X,24HNEW SCALED VARIABLES ARE      )                     STRDES  351
      403 FORMAT(1H ,//3X,I4,5X,1PE12.5,2X,E12.5,2X,E12.5,2X,E12.5)            STRDES  352
      404 FORMAT(1H ,13X,38HA CONSTRAINED MINIMUM HAS BEEN REACHED,            STRDES  353
         1//11X,43HTHE FINAL STORE PARAMETERS ARE LISTED BELOW,///)            STRDES  354
      405 FORMAT(1H ,//10X,25H CURRENT STEP SIZE =      ,OP1F10.3,             STRDES  355
         1//10X,25H CURRENT FLUTTER SPEED = ,OP1F10.3,8H   KNOTS)              STRDES  356
      406 FORMAT(1H1)                                                          STRDES  357
      407 FORMAT(1HO,10X,40HTHE FLUTTER SPEED HAS BEEN DECREASED BY ,F10.4,    STRDES  358
         17H KNOTS.)                                                           STRDES  359
     9000 FORMAT(///,10X, 28HDERIVATIVES FOR STORE NUMBER,I4)                  STRDES  360
     9001 FORMAT(/,10X,A4,2X,1PE15.5)                                          STRDES  361
       16 FORMAT(1X,I2,F6.1,1P6E10.3,5I2)                                      STRDES  362
          END                                                                  STRDES  363
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
1	STRDES	1	331

VARIABLES		SN TYPE	RELOCATION									
1754	A	REAL	*UNDEF		REFS	31						
2017	B	REAL	*UNDEF		REFS	31						
3326	BCOECS	REAL	ARRAY	INCCOM	REFS	21	36	72	80	308		
10315	BCOEF	REAL	ARRAY	JGL	REFS	16	72	80	308			
257	DELG	REAL	ARRAY	POWELL	REFS	10	93	321				
5500	DELGECS	REAL	ARRAY	STRCOM	REFS	22	36	93	321			
1730	DELTAV	REAL			REFS	114	118	119	165	DEFINED	113	
1735	DELV	REAL			REFS	167	168	DEFINED	165			
106	DELX	REAL	ARRAY	POWELL	REFS	10	90	318				
5327	DELXECS	REAL	ARRAY	STRCOM	REFS	22	36	90	318			
63	G	REAL	ARRAY	JGL	REFS	16	71	78	306			
0	GECS	REAL	ARRAY	INCCOM	REFS	21	36	71	78	306		
2160	GNEW	REAL	ARRAY		REFS	33	DEFINED	218	226	234	242	
1734	GR	REAL			REFS	155	175	197	198			
214	GRN	REAL	ARRAY	POWELL	REFS	10	92	175	181	218	226	234
					242	246	320					
5435	GRNECS	REAL	ARRAY	STRCOM	REFS	22	36	92	320			
151	GRO	REAL	ARRAY	POWELL	REFS	10	91	155	158	159	319	
5372	GROECS	REAL	ARRAY	STRCOM	REFS	22	36	91	319			
5207	HGR	REAL	ARRAY	POWELL	REFS	10	97	325				
12430	HGRECS	REAL	ARRAY	STRCOM	REFS	22	36	97	325			
2676	HN	REAL	ARRAY	POWELL	REFS	10	96	324				
10117	HNECS	REAL	ARRAY	STRCOM	REFS	22	36	96	324			
365	HO	REAL	ARRAY	POWELL	REFS	10	95	323				
5606	HOECS	REAL	ARRAY	STRCOM	REFS	22	36	95	323			
1731	I	INTEGER			REFS	144	145	146	147	150	152	153

```
      CALL TIMEB(10,11HFROM STRDES)                                     STRDES    287
      CALL MESAGE(2,6,6HSTRDES)                                         STRDES    288
      STPOLD= STEP                                                      STRDES    289
      IF(ISTEP EQ 0) ISTEP=1                                            STRDES    290
      ISTEP = ISTEP + 1                                                 STRDES    291
      ITESTO = ITESTN                                                   STRDES    292
      ISIZE = ISAVE                                                     STRDES    293
      WRITE(ITAPEW,406)                                                 STRDES    294
      WRITE(ITAPEN,406)                                                 STRDES    295
C                                                                       STRDES    296
CIBM                                                                    STRDES    297
C     WRITE (ITAPJP) JSET,JDIM,G,LMK,BCOEF,MSTAR,NOTJ,NOTDIM,LINDEP,    STRDES    298
C    1                LDDIM,NOTACT,NDIM,XO,XN,DELX,GRO,GRN,DELG,Z,HO,   STRDES    299
C    2                HN,HGR,NPARM,ICONV,ICN                            STRDES    300
C     REWIND ITAPJP                                                     STRDES    301
CIBM                                                                    STRDES    302
C                                                                       STRDES    303
CCDC                                                                    STRDES    304
      CALL WRITEC(JSET(1),JSETECS(1),50)                                STRDES    305
      CALL WRITEC(JDIM,JDIMECS,1)                                       STRDES    306
      CALL WRITEC(G(1,1),GECS(1,1),1750)                                STRDES    307
      CALL WRITEC(LMK(1,1),LMKECS(1,1),2500)                            STRDES    308
      CALL WRITEC(BCOEF(1),BCOECS(1),50)                                STRDES    309
      CALL WRITEC(MSTAR,MSTRECS,1)                                      STRDES    310
      CALL WRITEC(NOTJ(1),NOTJECS(1),50)                                STRDES    311
      CALL WRITEC(NOTDIM,NTDMECS,1)                                     STRDES    312
      CALL WRITEC(LINDEP(1),LNDECS(1),50)                               STRDES    313
      CALL WRITEC(LDDIM,LDMECS,1)                                       STRDES    314
      CALL WRITEC(NOTACT(1),NOTTECS(1),50)                              STRDES    315
      CALL WRITEC(NDIM,NDIMECS,1)                                       STRDES    316
      CALL WRITEC(XO(1),XOECS(1),35)                                    STRDES    317
      CALL WRITEC(XN(1),XNECS(1),35)                                    STRDES    318
      CALL WRITEC(DELX(1),DELXECS(1),35)                                STRDES    319
      CALL WRITEC(GRO(1),GROECS(1),35)                                  STRDES    320
      CALL WRITEC(GRN(1),GRNECS(1),35)                                  STRDES    321
      CALL WRITEC(DELG(1),DELGECS(1),35)                                STRDES    322
      CALL WRITEC(Z(1),ZECS(1),35)                                      STRDES    323
      CALL WRITEC(HO(1,1),HOECS(1,1),1225)                              STRDES    324
      CALL WRITEC(HN(1,1),HNECS(1,1),1225)                              STRDES    325
      CALL WRITEC(HGR(1),HGRECS(1),35)                                  STRDES    326
      CALL WRITEC(NPARM,NPMECS,1)                                       STRDES    327
      CALL WRITEC(ICONV,ICNVECS,1)                                      STRDES    328
      CALL WRITEC(ICN,ICNECS,1)                                         STRDES    329
CCDC                                                                    STRDES    330
C                                                                       STRDES    331
      RETURN                                                            STRDES    332
  300 FORMAT(1HO,10X,43HEXPECTED DELV GT ZERO.  GRAD MOVE ATTEMPTED )   STRDES    333
  301 FORMAT(1HO,10X,14HLEAVING CONSTR)                                 STRDES    334
  390 FORMAT(1H1,//11X,39HSTORE PARAMETERS FOR REDESIGN CYCLE NO.,I4)   STRDES    335
  391 FORMAT(1HO,10X,40HTHE FLUTTER SPEED HAS BEEN INCREASED BY ,F10.4, STRDES    336
     17H KNOTS.)                                                        STRDES    337
  392 FORMAT(1HO,10X,33HTHE PREVIOUS STEP SIZE IS REDUCED,              STRDES    338
     1//10X,53HAND THE PREVIOUS DERIVATIVES ARE USED FOR THIS CYCLE )   STRDES    339
  393 FORMAT(1HO,10X,33HNORM OF SCALED GRADIENT VECTOR = ,1P1E15.4)     STRDES    340
  394 FORMAT(1HO,10X,52HNORM OF SCALED INCREMENTAL STORE PARAMETER VECTO STRDES    341
     1R = ,1P1E15.4)                                                    STRDES    342
  395 FORMAT (5(2X,1PE12.5))                                            STRDES    343
```

```
      DO 14 J= 1,3                                                      STRDES 230
      JJ=J+4                                                            STRDES 231
      IF(SCALE(I,JJ) .EQ. 0.) GO TO 14                                  STRDES 232
      K=K+1                                                             STRDES 233
      KK=KK+1                                                           STRDES 234
      GNEW(KK)= GRN(K)                                                  STRDES 235
      XNEW(KK)= STRRN(I,J)                                              STRDES 236
   14 CONTINUE                                                          STRDES 237
      DO 15 J=1,6                                                       STRDES 238
      JJ=J+7                                                            STRDES 239
      IF(SCALE(I,JJ) .EQ. 0.) GO TO 15                                  STRDES 240
      K=K+1                                                             STRDES 241
      KK=KK+1                                                           STRDES 242
      GNEW(KK)= GRN(K)                                                  STRDES 243
      XNEW(KK)= STRFN(I,J)                                              STRDES 244
   15 CONTINUE                                                          STRDES 245
      IF(KK.EQ.0) GO TO 11                                              STRDES 246
      WRITE(39,16) ISTEP,VNOW,(XNEW(J),J=1,3),(GRN(K1),K1=1,3)          STRDES 247
     1             ,(JSET(K2),K2=1,JDIM)                                STRDES 248
   11 CONTINUE                                                          STRDES 249
      INDEX= 2                                                          STRDES 250
      CALL VSCALE(INDEX,STEP)                                           STRDES 251
C                                                                       STRDES 252
C LIST NEW STORE PARAMETERS                                             STRDES 253
C                                                                       STRDES 254
      ITAP=ITAPEW                                                       STRDES 255
      LOOP=1                                                            STRDES 256
    4 CONTINUE                                                          STRDES 257
      WRITE(ITAP,413)                                                   STRDES 258
      WRITE(ITAP,395) (XN(I), I=1,NPARM)                                STRDES 259
      WRITE(ITAP,401)                                                   STRDES 260
      WRITE(ITAP,402) TYPE(1), (I         , I=1,NUMSTR)                 STRDES 261
      WRITE(ITAP,409)                                                   STRDES 262
      WRITE(ITAP,410) TYPE(2), (STRWN(I)  , I=1,NUMSTR)                 STRDES 263
      WRITE(ITAP,410) TYPE(3), (STRIN(I,1), I=1,NUMSTR)                 STRDES 264
      WRITE(ITAP,410) TYPE(4), (STRIN(I,2), I=1,NUMSTR)                 STRDES 265
      WRITE(ITAP,410) TYPE(5), (STRIN(I,3), I=1,NUMSTR)                 STRDES 266
      WRITE(ITAP,410) TYPE(6), (STRRN(I,1), I=1,NUMSTR)                 STRDES 267
      WRITE(ITAP,410) TYPE(7), (STRRN(I,2), I=1,NUMSTR)                 STRDES 268
      WRITE(ITAP,410) TYPE(8), (STRRN(I,3), I=1,NUMSTR)                 STRDES 269
      WRITE(ITAP,410) TYPE(9), (STRFN(I,1), I=1,NUMSTR)                 STRDES 270
      WRITE(ITAP,410) TYPE(10), (STRFN(I,2), I=1,NUMSTR)                STRDES 271
      WRI˜E(ITAP,410) TYPE(11), (STRFN(I,3), I=1,NUMSTR)                STRDES 272
      WRITE(ITAP,410) TYPE(12), (STRFN(I,4), I=1,NUMSTR)                STRDES 273
      WRITE(ITAP,410) TYPE(13), (STRFN(I,5), I=1,NUMSTR)                STRDES 274
      WRITE(ITAP,410) TYPE(14), (STRFN(I,6), I=1,NUMSTR)                STRDES 275
      IF(LOOP .GT. 1) GO TO 5                                           STRDES 276
      LOOP=2                                                            STRDES 277
      ITAP=ITAPEN                                                       STRDES 278
      GO TO 4                                                           STRDES 279
    5 CONTINUE                                                          STRDES 280
C                                                                       STRDES 281
C                                                                       STRDES 282
C     SET ICYCLE TO NEGATIVE VALUE TO EXIT FROM AVAM-AFAM-AFOM LOOP.    STRDES 283
C                                                                       STRDES 284
      WRITE(ITAPEW,405) STEP,VX                                         STRDES 285
      WRITE(ITAPEN,405) STEP,VX                                         STRDES 286
```

```
      IF(M4.GE.2) M2= O                                      STRDES     173
      IF(M4 GE 2) M3= O                                      STRDES     174
      CALL MURT(STEP)                                        STRDES     175
      CALL NRM2(GRN,GR,NPARM)                                STRDES     176
C                                                            STRDES     177
      ITAP=ITAPEW                                            STRDES     178
      LOOP=1                                                 STRDES     179
    6 CONTINUE                                               STRDES     180
      WRITE(ITAP,400)                                        STRDES     181
      WRITE(ITAP,395) (GRN(I),I=1,NPARM)                     STRDES     182
      WRITE(ITAP,411)                                        STRDES     183
      WRITE(ITAP,395) (XO(I), I=1,NPARM)                     STRDES     184
      WRITE(ITAP,412)                                        STRDES     185
      WRITE(ITAP,395) (XN(I), I=1,NPARM)                     STRDES     186
      IF(LOOP.GT.1) GO TO 7                                  STRDES     187
      LOOP=2                                                 STRDES     188
      ITAP=ITAPEN                                            STRDES     189
      GO TO 6                                                STRDES     190
    7 CONTINUE                                               STRDES     191
C                                                            STRDES     192
C RESET XOLD BEFORE TAKING STEP                              STRDES     193
C                                                            STRDES     194
      DO 3 I= 1,NPARM                                        STRDES     195
    3 XO(I)= XN(I)                                           STRDES     196
   75 CONTINUE                                               STRDES     197
      WRITE(ITAPEW,393) GR                                   STRDES     198
      WRITE(ITAPEN,393) GR                                   STRDES     199
C                                                            STRDES     200
C     CALL CONSTR TO APPLY CONSTRAINTS TO STEP               STRDES     201
C                                                            STRDES     202
      CALL CONSTR(ISTEP,STEP)                                STRDES     203
      WRITE(ITAPEW,301)                                      STRDES     204
  100 CONTINUE                                               STRDES     205
       ALL USTEP(STEP)                                       STRDES     206
C UNLC  VECTORS                                              STRDES     207
C                                                            STRDES     208
  101 CONTINUE                                               STRDES     209
C                                                            STRDES     210
C SET-UP AND PRINT CONDENSED OUTPUT                          STRDES     211
C                                                            STRDES     212
      K=O                                                    STRDES     213
      DO 11 I= 1,NUMSTR                                      STRDES     214
      KK=O                                                   STRDES     215
      IF(SCALE(I,1) .EQ. O.) GO TO 12                        STRDES     216
      K=K+1                                                  STRDES     217
      KK=KK+1                                                STRDES     218
      GNEW(KK)= GRN(K)                                       STRDES     219
      XNEW(KK)= STRWN(I)                                     STRDES     220
   12 DO 13 J= 1,3                                           STRDES     221
      JJ=J+1                                                 STRDES     222
      IF(SCALE(I,JJ) .EQ. O.) GO TO 13                       STRDES     223
      IF(J.EQ.3 .AND. KCONST.EQ.O) GO TO 13                  STRDES     224
      K=K+1                                                  STRDES     225
      KK=KK+1                                                STRDES     226
      GNEW(KK)= GRN(K)                                       STRDES     227
      XNEW(KK)= STRIN(I,J)                                   STRDES     228
   13 CONTINUE                                               STRDES     229
```

```
      M1= M1 + 1                                              STRDES    116
      M4= 0                                                   STRDES    117
      IF(M1 GE.3) M2= M2 + 1                                  STRDES    118
      WRITE(ITAPEW,391) DELTAV                                STRDES    119
      WRITE(ITAPEN,391) DELTAV                                STRDES    120
C  ***************************************************        STRDES    121
C  *       THE FOLLOWING CALL IS NOT VALID WITH THE    *      STRDES    122
C  *       CURRENT VERSION OF OF ESP.                  *      STRDES    123
C  ***************************************************        STRDES    124
C     IF(M2.GT.0) CALL RILL(STEP,&101,&105)                   STRDES    125
      IF(M2.GT.0) CALL RILL                                   STRDES    126
      IF(M1.EQ.1) GO TO 105                                   STRDES    127
      IF(ICONV.NE.1) GO TO 105                                STRDES    128
      STEP= STEP/2.                                           STRDES    129
      GO TO 75                                                STRDES    130
C                                                             STRDES    131
C LINE-SEARCH MUST BE DONE                                    STRDES    132
C AND NEWDIM MUST BE RESET TO ZERO                            STRDES    133
C                                                             STRDES    134
  105 CONTINUE                                                STRDES    135
      NEWDIM = 0                                              STRDES    136
      CALL LINESR(STEP)                                       STRDES    137
      WRITE(ITAPEW,392)                                       STRDES    138
      WRITE(ITAPEN,392)                                       STRDES    139
C                                                             STRDES    140
C LIST OLD DERIVATIVES OF STORE VARIABLES                     STRDES    141
C WHEN FLUTTER SPEED INCREASES.                               STRDES    142
C                                                             STRDES    143
      DO 80 I = 1,NUMSTR                                      STRDES    144
      WRITE(ITAPEW,9000) IDSTR(I)                             STRDES    145
      WRITE(ITAPEN,9000) IDSTR(I)                             STRDES    146
      WRITE(ITAPEW,9001) VAR(1),STRWDO(I)                     STRDES    147
      WRITE(ITAPEN,9001) VAR(1),STRWDO(I)                     STRDES    148
      DO 80 J=1,3                                             STRDES    149
      K=J+3                                                   STRDES    150
      IF(IDYDOF(I,K).EQ.0) GO TO 80                           STRDES    151
      K=J+1                                                   STRDES    152
      WRITE(ITAPEW,9001) VAR(K),STRIDO(I,J)                   STRDES    153
      WRITE(ITAPEN,9001) VAR(K),STRIDO(I,J)                   STRDES    154
   80 CONTINUE                                                STRDES    155
      CALL NRM2(GRO,GR,NPARM)                                 STRDES    156
      WRITE(ITAPEW,400)                                       STRDES    157
      WRITE(ITAPEN,400)                                       STRDES    158
      WRITE(ITAPEN,395) (GRO(I),I=1,NPARM)                    STRDES    159
      WRITE(ITAPEW,395) (GRO(I),I=1,NPARM)                    STRDES    160
      GO TO 100                                               STRDES    161
C                                                             STRDES    162
C DETERMINE NEW HESSIAN                                       STRDES    163
C AND NEW SEARCH DIRECTION                                    STRDES    164
C                                                             STRDES    165
    2 DELV= ABS(DELTAV)                                       STRDES    166
      ICN= 0                                                  STRDES    167
      WRITE(ITAPEW,407) DELV                                  STRDES    168
      WRITE(ITAPEN,407) DELV                                  STRDES    169
      STEP= 1.0                                               STRDES    170
      M1= 0                                                   STRDES    171
      M4= M4 + 1                                              STRDES    172
```

```
      WRITE(ITAPEN,390) ISTEP2
      VX= VNEW
      VNOW = VNSAVE
C
CIBM
C     READ (ITAPJP) JSET,JDIM,G,LMK,BCOEF,MSTAR,NOTJ.NOTDIM,LINDEP,
C    1              LDDIM,NOTACT,NDIM,XO,XN,DELX,GRO,GRN,DELG,Z,HO,
C    2              HN,HGR,NPARM,ICONV,ICN
C     REWIND ITAPJP
CIBM
C
CCDC
      IF (NCYC.NE.O)  GO TO 20
      CALL READEC(G(1,1),GECS(1,1),1750)
      CALL READEC(BCOEF(1),BCOECS(1),50)
      CALL READEC(MSTAR,MSTRECS,1)
      CALL READEC(NPARM,NPMECS,1)
      GO TO 25
   20 CALL READEC(JSET(1),JSETECS(1),50)
      CALL READEC(JDIM,JDIMECS,1)
      CALL READEC(G(1,1),GECS(1,1),1750)
      CALL READEC(LMK(1,1),LMKECS(1,1),2500)
      CALL READEC(BCOEF(1),BCOECS(1),50)
      CALL READEC(MSTAR,MSTRECS,1)
      CALL READEC(NOTJ(1),NOTJECS(1),50)
      CALL READEC(NOTDIM,NTDMECS,1)
      CALL READEC(LINDEP(1),LNDECS(1),50)
      CALL READEC(LDDIM,LDMECS,1)
      CALL READEC(NOTACT(1),NOTTECS(1),50)
      CALL READEC(NDIM,NDIMECS,1)
      CALL READEC(XO(1),XOECS(1),35)
      CALL READEC(XN(1),XNECS(1),35)
      CALL READEC(DELX(1),DELXECS(1),35)
      CALL READEC(GRO(1),GROECS(1),35)
      CALL READEC(GRN(1),GRNECS(1),35)
      CALL READEC(DELG(1),DELGECS(1),35)
      CALL READEC(Z(1),ZECS(1),35)
      CALL READEC(HO(1,1),HOECS(1,1),1225)
      CALL READEC(HN(1,1),HNECS(1,1),1225)
      CALL READEC(HGR(1),HGRECS(1),35)
      CALL READEC(NPARM,NPMECS,1)
      CALL READEC(ICONV,ICNVECS,1)
      CALL READEC(ICN,ICNECS,1)
   25 CONTINUE
CCDC
C
C DIRECTS STORE SEARCH - MURTAGH / SARGENT METHOD
C
      STEP=STPOLD
      INDEX= 1
      CALL VSCALE(INDEX,STEP)
C
C TEST FOR OVERSHOOT AND
C PROXIMITY TO DISCONTINUITIES
C
    1 DELTAV= (VNSAVE - VOSAVE)
      IF(DELTAV.LE.O.O) GO TO 2
```

```
VARIABLES      SN  TYPE           RELOCATION
    76  IDSTR     INTEGER    ARRAY    STORES       REFS         9
    40  IDYDOF    INTEGER    ARRAY    STORES       REFS         9
   212  IPERM     INTEGER   *UNDEF                 REFS        26
     2  ISTDOF    INTEGER    ARRAY    STORES       REFS         9
     1  ISTEP     INTEGER             STRCLU       REFS        16
   116  ITAPEN    INTEGER                        DEFINED       28    I/O REFS      45        47
     0  ITAPES    INTEGER    ARRAY    CTAPES       REFS        25       26         27        28
   115  ITAPEW    INTEGER                        DEFINED       27    I/O REFS      44        46
     1  KCONST    INTEGER             STORES       REFS         9
     2  M1        INTEGER             STRCLU       REFS        16
     3  M2        INTEGER             STRCLU       REFS        16
     4  M3        INTEGER             STRCLU       REFS        16
     5  M4        INTEGER             STRCLU       REFS        16
     0  NDS       INTEGER             DIRECT       REFS        23
  5252  NPARM     INTEGER             POWELL       REFS        17       31         39
     0  NUMSTR    INTEGER             STORES       REFS         9
   362  SCALE     REAL       ARRAY    STORES       REFS         9
    11  STPOLD    REAL                STRCLU       REFS        16
   653  STRFDN    REAL       ARRAY    STORES       REFS         9
   615  STRFDO    REAL       ARRAY    STORES       REFS         9
   463  STRFI     REAL       ARRAY    STORES       REFS         9
   557  STRFN     REAL       ARRAY    STORES       REFS         9
   521  STRFO     REAL       ARRAY    STORES       REFS         9
   305  STRIDN    REAL       ARRAY    STORES       REFS         9
   266  STRIDO    REAL       ARRAY    STORES       REFS         9
   122  STRII     REAL       ARRAY    STORES       REFS         9
   160  STRIN     REAL       ARRAY    STORES       REFS         9
   141  STRIO     REAL       ARRAY    STORES       REFS         9
   343  STRRDN    REAL       ARRAY    STORES       REFS         9
   324  STRRDO    REAL       ARRAY    STORES       REFS         9
   177  STRRI     REAL       ARRAY    STORES       REFS         9
   235  STRRN     REAL       ARRAY    STORES       REFS         9
   216  STRRO     REAL       ARRAY    STORES       REFS         9
   261  STRWDN    REAL       ARRAY    STORES       REFS         9
   254  STRWDO    REAL       ARRAY    STORES       REFS         9
   103  STRWI     REAL       ARRAY    STORES       REFS         9
   115  STRWN     REAL       ARRAY    STORES       REFS         9
   110  STRWO     REAL       ARRAY    STORES       REFS         9
   121  SUM       REAL                             REFS        39    DEFINED       34
    10  VNEW      REAL                STRCLU       REFS        16
     7  VOLD      REAL                STRCLU       REFS        16
     6  VS        REAL                STRCLU       REFS        16
   123  XDEL      REAL       ARRAY                 REFS        19      2*39    DEFINED       32
     1  XJ        REAL       ARRAY    DIRECT       REFS        23
    43  XN        REAL       ARRAY    POWELL       REFS        17       32
     0  XO        REAL       ARRAY    POWELL       REFS        17       32
   322  Z         REAL       ARRAY    POWELL       REFS        17
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
        MESAGE               3              29         48
        SOSCAP    REAL       8              39
        SQRT      REAL       1 LIBRARY      40

STATEMENT LABELS            DEF LINE   REFERENCES
     0  1                      32          31
    74  400      FMT          136          44         45
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STATEMENT LABELS              DEF LINE   REFERENCES
  102  401      FMT              137         46          47

LOOPS  LABEL    INDEX      FROM-TO     LENGTH   PROPERTIES
   12  1        I            31 32         3B     INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       STORES      457                0 NUMSTR (1)             1 KCONST (1)             2 ISTDOF (30)
                                     32 IDYDOF (30)           62 IDSTR  (5)            67 STRWI  (5)
                                     72 STRWO  (5)            77 STRWN  (5)            82 STRII  (15)
                                     97 STRIO  (15)          112 STRIN  (15)          127 STRRI  (15)
                                    142 STRRO  (15)          157 STRRN  (15)          172 STRWDO (5)
                                    177 STRWDN (5)           182 STRIDO (15)          197 STRIDN (15)
                                    212 STRRDO (15)          227 STRRDN (15)          242 SCALE  (65)
                                    307 STRFI  (30)          337 STRFO  (30)          367 STRFN  (30)
                                    397 STRFDO (30)          427 STRFDN (30)
       STRCLU       10                0 ICYCLE (1)             1 ISTEP  (1)             2 M1     (1)
                                      3 M2     (1)             4 M3     (1)             5 M4     (1)
                                      6 VS     (1)             7 VOLD   (1)             8 VNEW   (1)
                                      9 STPOLD (1)
       POWELL     2733                0 XO     (35)           35 XN     (35)           70 DELX   (35)
                                    105 GRO    (35)          140 GRN    (35)          175 DELG   (35)
                                    210 Z      (35)          245 HO     (1225)       1470 HN     (1225)
                                   2695 HGR    (35)         2730 NPARM  (1)          2731 ICONV  (1)
                                   2732 ICN    (1)
       DIRECT      301                0 NDS    (1)             1 XJ     (300)
       CONS         80                0 CON    (80)
       CTAPES       50                0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                  242B      162
  CM LABELED COMMON LENGTH       7057B     3631
          52000B CM USED
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```
      SUBROUTINE VSCALE(INDEX,STEP)                                     VSCALE   2
CIBM                                                                    VSCALE   3
C     REAL*8 SUM                                                        VSCALE   4
CIBM                                                                    VSCALE   5
      COMMON/CTAPES/ ITAPES                                             VSCALE   6
      COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    VSCALE   7
     A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)           VSCALE   8
     B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                VSCALE   9
     C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                VSCALE  10
     D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                        VSCALE  11
     E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                           VSCALE  12
     F      ,STRFDO(5,6),STRFDN(5,6)                                    VSCALE  13
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD      VSCALE  14
      COMMON/POWELL/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)    VSCALE  15
     1              ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICONV,ICN  VSCALE  16
      DIMENSION ITAPES(50)                                              VSCALE  17
      DIMENSION A(35),B(35),C(35),IPERM(35)                             VSCALE  18
C                                                                       VSCALE  19
C PUTS VARIABLES AND DERIVATIVES                                        VSCALE  20
C INTO VECTOR FORM AND SCALES THEM                                      VSCALE  21
C                                                                       VSCALE  22
      ITAPER= ITAPES(5)                                                 VSCALE  23
      ITAPEW= ITAPES(6)                                                 VSCALE  24
      ITAPEN = ITAPES( 40 )                                             VSCALE  25
      ITAPEP = ITAPES(48)                                               VSCALE  26
C                                                                       VSCALE  27
CCDC                                                                    VSCALE  28
      ITAPEI = ITAPES(47)                                               VSCALE  29
CCDC                                                                    VSCALE  30
C                                                                       VSCALE  31
      CALL MESAGE(1,6,6HVSCALE)                                         VSCALE  32
      IF(INDEX.GT.1) GO TO 20                                           VSCALE  33
      IF(ISTEP.GT.1) GO TO 10                                           VSCALE  34
C                                                                       VSCALE  35
C INITIAL SET-UP OF VECTORS, CONSTRAINTS AND INVERSE HESSIAN            VSCALE  36
C                                                                       VSCALE  37
      NDS= 1                                                            VSCALE  38
      K= 0                                                              VSCALE  39
      ICN= 0                                                            VSCALE  40
      DO 1 I= 1,NUMSTR                                                  VSCALE  41
      IF(SCALE(I,1).EQ.0.) GO TO 2                                      VSCALE  42
      K= K + 1                                                          VSCALE  43
      XO(K) = STRWI(I)/SCALE(I,1)                                       VSCALE  44
      XN(K)=  XO(K)                                                     VSCALE  45
      DELX(K)= 0.                                                       VSCALE  46
      GRN(K)= STRWDN(I)*SCALE(I,1)/VS                                   VSCALE  47
      GRO(K)= 0.                                                        VSCALE  48
      DELG(K)= GRN(K)                                                   VSCALE  49
    2 DO 3 J= 1,3                                                       VSCALE  50
      JJ= J + 1                                                         VSCALE  51
      IF(SCALE(I,JJ).EQ.0.) GO TO 3                                     VSCALE  52
      IF(J.EQ.3 .AND. KCONST.EQ.0) GO TO 3                              VSCALE  53
      K= K + 1                                                          VSCALE  54
      XO(K)= STRII(I,J)/SCALE(I,JJ)                                     VSCALE  55
      XN(K)= XO(K)                                                      VSCALE  56
      DELX(K)= 0.                                                       VSCALE  57
      GRN(K)= STRIDN(I,J)*SCALE(I,JJ)/VS                                VSCALE  58
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           GRO(K)= O.                                                  VSCALE    59
           DELG(K)= GRN(K)                                             VSCALE    60
         3 CONTINUE                                                    VSCALE    61
           DO 15 J= 1,3                                                VSCALE    62
           JJ= J+4                                                     VSCALE    63
           IF(SCALE(I,JJ) .EQ. O.) GO TO 15                            VSCALE    64
           K= K+1                                                      VSCALE    65
           XO(K) = STRRI(I,J)/SCALE(I,JJ)                              VSCALE    66
           XN(K) = XO(K)                                               VSCALE    67
           DELX(K)= O.                                                 VSCALE    68
           GRN(K)= STRRDN(I,J)*SCALE(I,JJ)/VS                          VSCALE    69
           GRO(K)= O.                                                  VSCALE    70
           DELG(K)= GRN(K)                                             VSCALE    71
        15 CONTINUE                                                    VSCALE    72
           DO 17 J= 1,6                                                VSCALE    73
           JJ= J + 7                                                   VSCALE    74
           IF(SCALE(I,JJ) .EQ. O.) GO TO 17                            VSCALE    75
           K= K+1                                                      VSCALE    76
           XO(K)  = STRFN(I,J)/SCALE(I,JJ)                             VSCALE    77
           XN(K)  = XO(K)                                              VSCALE    78
           DELX(K)= O.                                                 VSCALE    79
           GRO(K) = O.                                                 VSCALE    80
           GRN(K) = STRFDN(I,J)*SCALE(I,JJ)/VS                         VSCALE    81
           DELG(K)= GRN(K)                                             VSCALE    82
        17 CONTINUE                                                    VSCALE    83
         1 CONTINUE                                                    VSCALE    84
           VOLD= VOLD/VS                                               VSCALE    85
           VNEW= VNEW/VS                                               VSCALE    86
           NPARM= K                                                    VSCALE    87
           DO 5 I= 1,NPARM                                             VSCALE    88
           DO 4 J= 1,NPARM                                             VSCALE    89
           HN(I,J)= O.                                                 VSCALE    90
           IF(J.EQ.I) HN(I,J)= 1.                                      VSCALE    91
         4 CONTINUE                                                    VSCALE    92
         5 CONTINUE                                                    VSCALE    93
           IF (ISTEP.GT.O) GO TO 6                                     VSCALE    94
C                                                                      VSCALE    95
C A RESTART.  READ OLD VECTORS,                                        VSCALE    96
C GRAD, HESSIAN, AND FUNCTION                                          VSCALE    97
C                                                                      VSCALE    98
CCDC                                                                   VSCALE    99
           READ (ITAPEI,300) (XO(I),I=1,NPARM)                         VSCALE   100
           DO 7 I=1,NPARM                                              VSCALE   101
           READ (ITAPEI,300) (HO(I,J),J=1,NPARM)                       VSCALE   102
           DO 7 J=1,NPARM                                              VSCALE   103
         7 HN(I,J) = HO(I,J)                                           VSCALE   104
           READ (ITAPEI,300) (GRO(I),I=1,NPARM)                        VSCALE   105
           READ (ITAPEI,301) STEP                                      VSCALE   106
           READ (ITAPEI,301) VOLD                                      VSCALE   107
CCDC                                                                   VSCALE   108
C                                                                      VSCALE   109
CIBM                                                                   VSCALE   110
C          READ(ITAPER,300) (XO(I), I=1,NPARM)                         VSCALE   111
C          DO 7 I= 1,NPARM                                             VSCALE   112
C          READ(ITAPER,300) (HO(I,J), J=1,NPARM)                       VSCALE   113
C          DO 7 J= 1,NPARM                                             VSCALE   114
C        7 HN(I,J)= HO(I,J)                                            VSCALE   115
```

```
C     READ(ITAPER,300) (GRO(I), I=1,NPARM)                 VSCALE  116
C     READ(ITAPER,301) STEP                                VSCALE  117
C     READ(ITAPER,301) VOLD                                VSCALE  118
CIBM                                                       VSCALE  119
C                                                          VSCALE  120
      VOLD= VOLD/VS                                        VSCALE  121
      DO 8 I= 1,NPARM                                      VSCALE  122
      DELX(I)= XN(I) - XO(I)                               VSCALE  123
      DELG(I)= GRN(I)-GRO(I)                               VSCALE  124
    8 CONTINUE                                             VSCALE  125
      DO 9 I= 1,NPARM                                      VSCALE  126
CCDC                                                       VSCALE  127
      SUM = 0.0                                            VSCALE  128
CCDC                                                       VSCALE  129
CIBM                                                       VSCALE  130
C     SUM = 0.DO                                           VSCALE  131
CIBM                                                       VSCALE  132
      HGR(I)= SOSCAP(HO,GRO,SUM,NPARM,20,1,I,1)            VSCALE  133
    9 CONTINUE                                             VSCALE  134
      INDEX=1                                              VSCALE  135
      CALL RECONS(INDEX)                                   VSCALE  136
    6 CONTINUE                                             VSCALE  137
      RETURN                                               VSCALE  138
C                                                          VSCALE  139
C LOAD-UP VECTORS, SWITCH HESSIAN                          VSCALE  140
C                                                          VSCALE  141
   10 K=0                                                  VSCALE  142
      DO 11 I= 1,NUMSTR                                    VSCALE  143
      IF(SCALE(I,1).EQ.O.) GO TO 12                        VSCALE  144
      K= K + 1                                             VSCALE  145
      XO(K)= STRWO(I)/SCALE(I,1)                           VSCALE  146
      XN(K)= STRWN(I)/SCALE(I,1)                           VSCALE  147
      GRO(K)= STRWDO(I)*SCALE(I,1)/VS                      VSCALE  148
      GRN(K)= STRWDN(I)*SCALE(I,1)/VS                      VSCALE  149
   12 DO 13 J= 1,3                                         VSCALE  150
      JJ= J+1                                              VSCALE  151
      IF(SCALE(I,JJ).EQ.O.) GO TO 13                       VSCALE  152
      IF(J.EQ.3 .AND. KCONST.EQ.O) GO TO 13                VSCALE  153
      K= K+1                                               VSCALE  154
      XO(K)= STRIO(I,J)/SCALE(I,JJ)                        VSCALE  155
      XN(K)= STRIN(I,J)/SCALE(I,JJ)                        VSCALE  156
      GRO(K)= STRIDO(I,J)*SCALE(I,JJ)/VS                   VSCALE  157
      GRN(K)= STRIDN(I,J)*SCALE(I,JJ)/VS                   VSCALE  158
   13 CONTINUE                                             VSCALE  159
      DO 16 J= 1,3                                         VSCALE  160
      JJ= J+4                                              VSCALE  161
      IF(SCALE(I,JJ) .EQ. O.) GO TO 16                     VSCALE  162
      K= K+1                                               VSCALE  163
      XO(K) =  STRRO(I,J)/SCALE(I,JJ)                      VSCALE  164
      XN(K) =  STRRN(I,J)/SCALE(I,JJ)                      VSCALE  165
      GRO(K)= STRRDO(I,J)*SCALE(I,JJ)/VS                   VSCALE  166
      GRN(K)= STRRDN(I,J)*SCALE(I,JJ)/VS                   VSCALE  167
   16 CONTINUE                                             VSCALE  168
      DO 18 J= 1,6                                         VSCALE  169
      JJ=J+7                                               VSCALE  170
      IF(SCALE(I,JJ) .EQ. O.) GO TO 18                     VSCALE  171
      K= K+1                                               VSCALE  172
```

```
      XO(K)  = STRFO(I,J)/SCALE(I,JJ)
      XN(K)  = STRFN(I,J)/SCALE(I,JJ)
      GRO(K) =STRFDO(I,J)*SCALE(I,JJ)/VS
      GRN(K) =STRFDN(I,J)*SCALE(I,JJ)/VS
   18 CONTINUE
   11 CONTINUE
      DO 14 I=1,K
      DO 14 J=1,K
   14 HO(I,J)= HN(I,J)
      VNEW= VNEW/VS
C
C SAVE STORE INFO FOR RESTART
C
      REWIND ITAPEP
      WRITE(ITAPEP,300) (XO(I),I=1,NPARM)
      DO 25 I= 1,NPARM
      WRITE(ITAPEP,300) (HO(I,J),J=1,NPARM)
   25 CONTINUE
      WRITE(ITAPEP,300) (GRO(I),I=1,NPARM)
      WRITE(ITAPEP,301) STEP
      WRITE(ITAPEP,301) VOLD
      INDEX=0
      CALL RECONS(INDEX)
      VOLD= VOLD/VS
      RETURN
C
C UNLOAD VECTORS
C
   20 K=0
      DO 21 I= 1,NUMSTR
      IF(SCALE(I,1).EQ.O.) GO TO 22
      K= K+1
      STRWN(I) = XN(K)*SCALE(I,1)
      STRWO(I)= XO(K)*SCALE(I,1)
      STRWDN(I)= GRN(K)*VS/SCALE(I,1)
   22 DO 23 J= 1,3
      JJ= J+1
      IF(SCALE (I,JJ).EQ.O.) GO TO 23
      K= K+1
      IF(J.EQ.3 .AND. KCONST.EQ.O) K= K-1
      STRIO(I,J)= XO(K)*SCALE(I,JJ)
      STRIN(I,J)= XN(K)*SCALE(I,JJ)
      STRIDN(I,J)= GRN(K)*VS/SCALE(I,JJ)
   23 CONTINUE
      DO 24 J= 1,3
      JJ= J+4
      IF(SCALE(I,JJ) .EQ. O.) GO TO 24
      K= K+1
      STRRO(I,J) =  XO(K)*SCALE(I,JJ)
      STRRN(I,J) =  XN(K)*SCALE(I,JJ)
      STRRDN(I,J)= GRN(K)*VS/SCALE(I,JJ)
   24 CONTINUE
      DO 19 J= 1,6
      JJ= J+7
      IF(SCALE(I,JJ) .EQ. O.) GO TO 19
      K= K+1
      STRFO(I,J) = XO(K)*SCALE(I,JJ)
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                    STRFN(I,J) = XN(K)*SCALE(I,JJ)                               VSCALE    230
  230               STRFDN(I,J)= GRN(K)*VS/SCALE(I,JJ)                           VSCALE    231
                 19 CONTINUE                                                     VSCALE    232
                 21 CONTINUE                                                     VSCALE    233
                    VNEW= VNEW*VS                                                VSCALE    234
                    VOLD= VOLD*VS                                                VSCALE    235
  235               RETURN                                                       VSCALE    236
              C                                                                  VSCALE    237
                300 FORMAT (5(2X,1PE12.5))                                       VSCALE    238
                301 FORMAT(35X,F10.3)                                            VSCALE    239
                    END                                                          VSCALE    240



      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  VSCALE           1         137         196         235

VARIABLES      SN  TYPE              RELOCATION
   741  A          REAL        *UNDEF                REFS        17
  1004  B          REAL        *UNDEF                REFS        17
  1047  C          REAL        *UNDEF                REFS        17
   257  DELG       REAL         ARRAY     POWELL     REFS        14   DEFINED        48        59        70        81       123
   106  DELX       REAL         ARRAY     POWELL     REFS        14   DEFINED        45        56        67        78       122
   214  GRN        REAL         ARRAY     POWELL     REFS        14        48        59        70        81       123       206
                                                      214       222       230   DEFINED        46        57        68        80
                                                      148       157       166       175
   151  GRO        REAL         ARRAY     POWELL     REFS        14       123       132       190   DEFINED        47        58
                                                       69        79       104       147       156       165       174
  5207  HGR        REAL         ARRAY     POWELL     REFS        14   DEFINED       132
  2676  HN         REAL         ARRAY     POWELL     REFS        14       180   DEFINED        89        90       103
   365  HO         REAL         ARRAY     POWELL     REFS        14       103       132       188   DEFINED       101       180
   735  I          INTEGER                           REFS        41      2*43      2*46        51      2*54      2*57        63
                                                     2*65      2*68        74      2*76      2*80        89      2*90        99
                                                      101     2*103       104     3*122     3*123     2*132       143     2*145
                                                    2*146     2*147     2*148       151     2*154     2*155     2*156     2*157
                                                      161     2*163     2*164     2*165     2*166       170     2*172     2*173
                                                    2*174     2*175     2*180       186       188       190       202     2*204
                                                    2*205     2*206       209     2*212     2*213     2*214       218     2*220
                                                    2*221     2*222       226     2*228     2*229     2*230
                                                  DEFINED        40        87        99       100       104       121       125
                                                      142       178       186       187       190       201
  5254  ICN        INTEGER                POWELL     REFS        14   DEFINED        39
  5253  ICONV      INTEGER                POWELL     REFS        14
     0  ICYCLE     INTEGER                STRCLU     REFS        13
    76  IDSTR      INTEGER      ARRAY     STORES     REFS         6
    40  IDYDOF     INTEGER      ARRAY     STORES     REFS         6
     0  INDEX      INTEGER                 F.P.      REFS        32       135       194   DEFINED         1       134       193
  1112  IPERM      INTEGER     *UNDEF                REFS        17
     2  ISTDOF     INTEGER      ARRAY     STORES     REFS         6
     1  ISTEP      INTEGER                STRCLU     REFS        13        33        93
   732  ITAPEI     INTEGER                        DEFINED        28   I/O REFS        99       101       104       105       106
   730  ITAPEN  *  INTEGER                        DEFINED        24
   731  ITAPEP     INTEGER                        DEFINED        25   I/O REFS       185       186       188       190       191
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      SUBROUTINE VSCALE      74/74    OPT=1                         FTN 4.8+577        85/01/23. 08.10.44        PAGE      6

VARIABLES       SN  TYPE              RELOCATION
                                                  192
  726  ITAPER  * INTEGER                        DEFINED      22
    0  ITAFES    INTEGER    ARRAY     CTAPES       REFS       5      16      22      23      24      25      28
  727  ITAPEW  * INTEGER                        DEFINED      23
  736  J         INTEGER                           REFS      50      52      54      57      62      65      68
                                                     73      76      80      89    2*90     101   2*103     150
                                                    152     154     155     156     157     160     163     164
                                                    165     166     169     172     173     174     175   2*180
                                                    188     208     211     212     213     214     217     220
                                                    221     222     225     228     229     230
                                                DEFINED      49      61      72      88     101     102     149
                                                    159     168     179     188     207     216     224
  737  JJ        INTEGER                           REFS      51      54      57      63      65      68      74
                                                     76      80     151     154     155     156     157     161
                                                    163     164     165     166     170     172     173     174
                                                    175     209     212     213     214     218     220     221
                                                    222     226     228     229     230 DEFINED      50      62
                                                     73     150     160     169     208     217     225
  734  K         INTEGER                           REFS      42      43    2*44      45      46      47    2*48
                                                     53      54    2*55      56      57 [illegible] 2*59   64
                                                     65    2*66      67      68      69    2*70      75      76
                                                   2*77      78      79      80    2*81      86     144     145
                                                    146     147     148     153     154     155     156     157
                                                    162     163     164     165     166     171     172     173
                                                    174     175     178     179     203     204     205     206
                                                    210     211     212     213     214     219     220     221
                                                    222     227     228     229     230 DEFINED      38      42
                                                     53      64      75     141     144     153     162     171
                                                    200     203     210     211     219     227
    1  KCONST    INTEGER              STORES       REFS       6      52     152     211
    2  M1        INTEGER              STRCLU       REFS      13
    3  M2        INTEGER              STRCLU       REFS      13
    4  M3        INTEGER              STRCLU       REFS      13
    5  M4        INTEGER              STRCLU       REFS      13
  733  NDS     * INTEGER                        DEFINED      37
 5252  NPARM     INTEGER              POWELL       REFS      14      87      88      99     100     101     102
                                                    104     121     125     132     186     187     188     190
                                                DEFINED      86
    0  NUMSTR    INTEGER              STORES       REFS       6      40     142     201
  362  SCALE     REAL       ARRAY     STORES       REFS       6      41      43      46      51      54      57
                                                     63      65      68      74      76      80     143     145
                                                    146     147     148     151     154     155     156     157
                                                    161     163     164     165     166     170     172     173
                                                    174     175     202     204     205     206     209     212
                                                    213     214     218     220     221     222     226     228
                                                    229     230
    0  STEP      REAL                 F.P.         REFS     191 DEFINED       1     105
   11  STPOLD    REAL                 STRCLU       REFS      13
  653  STRFDN    REAL       ARRAY     STORES       REFS       6      80     175 DEFINED     230
  615  STRFDO    REAL       ARRAY     STORES       REFS       6     174
  463  STRFI     REAL       ARRAY     STORES       REFS       6
  557  STRFN     REAL       ARRAY     STORES       REFS       6      76     173 DEFINED     229
  521  STRFO     REAL       ARRAY     STORES       REFS       6     172 DEFINED     228
  305  STRIDN    REAL       ARRAY     STORES       REFS       6      57     157 DEFINED     214
  266  STRIDO    REAL       ARRAY     STORES       REFS       6     156
  122  STRII     REAL       ARRAY     STORES       REFS       6      54
  160  STRIN     REAL       ARRAY     STORES       REFS       6     155 DEFINED     213
```

```
VARIABLES     SN  TYPE           RELOCATION
  141  STRIO      REAL      ARRAY    STORES      REFS         6      154   DEFINED     212
  343  STRRDN     REAL      ARRAY    STORES      REFS         6       68      166   DEFINED     222
  324  STRRDU     REAL      ARRAY    STORES      REFS         6      165
  177  STRRI      REAL      ARRAY    STORES      REFS         6       65
  235  STRRN      REAL      ARRAY    STORES      REFS         6      164   DEFINED     221
  216  STRRO      REAL      ARRAY    STORES      REFS         6      163   DEFINED     220
  261  STRWDN     REAL      ARRAY    STORES      REFS         6       46      148   DEFINED     206
  254  STRWDO     REAL      ARRAY    STORES      REFS         6      147
  103  STRWI      REAL      ARRAY    STORES      REFS         6       43
  115  STRWN      REAL      ARRAY    STORES      REFS         6      146   DEFINED     204
  110  STRWO      REAL      ARRAY    STORES      REFS         6      145   DEFINED     205
  740  SUM        REAL                           REFS       132  DEFINED      127
   10  VNEW       REAL               STRCLU      REFS        13       85      181     233   DEFINED      85      181
                                                  233
    7  VOLD       REAL               STRCLU      REFS        13       84      120     192      195     234
                                              DEFINED        84      106      120     195      234
    6  VS         REAL               STRCLU      REFS        13       46       57      68       80      84       85
                                                  120       147      148      156     157      165     166      174
                                                  175       181      195      206     214      222     230      233
                                                  234
   43  XN         REAL      ARRAY    POWELL      REFS        14      122      204     213      221     229
                                              DEFINED        44       55       66      77      146     155      164
                                                  173
    0  XO         REAL      ARRAY    POWELL      REFS        14       44       55      66       77     122      186
                                                  205       212      220      228  DEFINED      43      54       65
                                                   76        99      145      154     163      172
  322  Z          REAL      ARRAY    POWELL      REFS        14
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
       MESAGE               3           31
       RECONS               1          135      194
       SOSCAP     REAL      8          132

STATEMENT LABELS            DEF LINE   REFERENCES
    0  1                       83         40
   35  2                       49         41
   63  3                       60         49       51       52
    0  4                       91         88
    0  5                       92         87
  265  6                      136         93
    0  7                      103        100      102
    0  8                      124        121
    0  9                      133        125
  266  10                     141         33
    0  11                     177        142
  302  12                     149        143
  330  13                     158        149      151      152
    0  14                     180        178      179
  107  15                      71         61       63
  354  16                     167        159      161
  133  17                      82         72       74
  400  18                     176        168      170
  602  19                     231        224      226
  472  20                     200         32
    0  21                     232        201
  504  22                     207        202
```

```
STATEMENT LABELS            DEF LINE   REFERENCES
  535  23                      215        207       209
  557  24                      223        216       218
    0  25                      189        187
  715  300     FMT             237         99       101       104       186       188       190
  720  301     FMT             238        105       106       191       192

LOOPS  LABEL    INDEX     FROM-TO     LENGTH     PROPERTIES
   24  1        I          40 83       115B                NOT INNER
   50  3        J          49 60        15B         OPT
   77  15       J          61 71        12B         OPT
  123  17       J          72 82        12B         OPT
  147  5        I          87 92        15B                NOT INNER
  154  4        J          88 91         5B      INSTACK
  174  7        I         100 103       31B                EXT REFS  NOT INNER
  177           J         101 101       11B                EXT REFS
  216  7        J         102 103        3B      INSTACK
  243  8        I         121 124        6B      INSTACK
  253  9        I         125 133        7B                EXT REFS
  270  11       I         142 177      116B                NOT INNER
  315  13       J         149 158       15B         OPT
  344  16       J         159 167       12B         OPT
  370  18       J         168 176       12B         OPT
  407  14       I         178 180       14B                NOT INNER
  414  14       J         179 180        3B      INSTACK
  434  25       I         187 189       20B                EXT REFS  NOT INNER
  437           J         188 188       11B                EXT REFS
  474  21       I         201 232      114B                NOT INNER
  517  23       J         207 215       20B         OPT
  550  24       J         216 223       11B         OPT
  573  19       J         224 231       11B         OPT

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50              0 ITAPES (50)
       STORES      457              0 NUMSTR (1)               1 KCONST (1)              2 ISTDOF (30)
                                   32 IDYDOF (30)             62 IDSTR  (5)             67 STRWI  (5)
                                   72 STRWO  (5)              77 STRWN  (5)             82 STRII  (15)
                                   97 STRIO  (15)            112 STRIN  (15)           127 STRRI  (15)
                                  142 STRRO  (15)            157 STRRN  (15)           172 STRWDO (5)
                                  177 STRWDN (5)             182 STRIDO (15)           197 STRIDN (15)
                                  212 STRRDO (15)            227 STRRDN (15)           242 SCALE  (65)
                                  307 STRFI  (30)            337 STRFO  (30)           367 STRFN  (30)
                                  397 STRFDO (30)            427 STRFDN (30)
       STRCLU       10              0 ICYCLE (1)               1 ISTEP  (1)              2 M1     (1)
                                    3 M2     (1)               4 M3     (1)              5 M4     (1)
                                    6 VS     (1)               7 VOLD   (1)              8 VNEW   (1)
                                    9 STPOLD (1)
       POWELL     2733              0 XO     (35)             35 XN     (35)            70 DELX   (35)
                                  105 GRO    (35)            140 GRN    (35)           175 DELG   (35)
                                  210 Z      (35)            245 HO     (1225)        1470 HN     (1225)
                                 2695 HGR    (35)           2730 NPARM  (1)           2731 ICONV  (1)
                                 2732 ICN    (1)

STATISTICS
  PROGRAM LENGTH              1157B      623
  CM LABELED COMMON LENGTH    6262B     3250
          52000B CM USED
```

```
      SUBROUTINE MURT(STEP)
CIBM
C     REAL*8 SUM
CIBM
      COMMON/CTAPES/ ITAPES(50)
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW STPOLD
      COMMON/POWELL/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)
     1             ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICONV,ICN
      COMMON /MAX/ MAXDIM
      COMMON /MURTS/   YK(35)
      DIMENSION HY(35)
C      CALL MESAGE(1,4,4HMURT)
      WRITE(6,400)
  400 FORMAT(1HO,10X,13HENTERING MURT)
      ITAPEW = ITAPES(6)
      ITAPEN = ITAPES(40)
      IF(ISTEP.EQ.1) GO TO 8
C
      DO 1 I= 1,NPARM
      DELX(I)= XN(I) - XO(I)
      DELG(I)= GRN(I) -GRO(I)
    1 CONTINUE
C
C FORM Z AND CK
C
      DO 2 I= 1,NPARM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.DO
CIBM
    2 HY(I)= SOSCAP(HO,DELG,SUM,NPARM,MAXDIM,1,I,1)
      DO 3 I= 1,NPARM
    3 Z(I)= DELX(I) - HY(I)
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.DO
CIBM
      CK= SOSCAP(DELG,Z,SUM,NPARM,1,1,1,1)
C
C TEST CK AND NORM OF ZG/CK TO ENSURE
C INVERSE HESSIAN IS POSITIVE DEFINITE
C
      CALL NRM2(Z,W,NPARM)
      Z2= W*W
C
      ITAP=ITAPEW
      LOOP=1
   20 CONTINUE
      WRITE(ITAP,306)
      WRITE(ITAP,300) (DELX(I), I=1,NPARM)
      WRITE(ITAP,307)
      WRITE(ITAP,300) (DELG(I), I=1,NPARM)
      WRITE(ITAP,299)
```

```
      DO 100 I= 1,NPARM
  100 WRITE(ITAP,300) (HO(I,J), J=1,NPARM)
      WRITE(ITAP,308)
      WRITE(ITAP,300) (HY(I), I=1,NPARM)
      WRITE(ITAP,309)
      WRITE(ITAP,300) (Z(I), I=1,NPARM)
      WRITE(ITAP,301) CK,Z2
      IF(LOOP.GT.1) GO TO 21
      LOOP=2
      ITAP=ITAPEN
      GO TO 20
   21 CONTINUE
      IF(W.GT.1.E-06) GO TO 30
      WRITE(ITAPEW,305)
      WRITE(ITAPEN,305)
      DO 25 I=1,NPARM
      DO 25 J=1,NPARM
      HN(I,J) = HO(I,J)
25    CONTINUE
      GO TO 8
30    CONTINUE
      EPS= 1.0E-04
      TEST= EPS*Z2
      IF(ABS(CK).LT.TEST) GO TO 4
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      W= SOSCAP(Z,GRO,SUM,NPARM,1,1,1,1)
      EPS= -1.0E-08
      W= W/CK
      IF(W.LE.EPS) GO TO 6
C
C RESET INVERSE HESSIAN
C
    4 CONTINUE
      WRITE(ITAPEW,304) W
      WRITE(ITAPEN,304) W
      DO 5 I= 1,NPARM
      DO 5 J= 1,NPARM
      YK(J) = Z(J)/Z2
5     HN(I,J) = Z(I) * YK(J) + HO(I,J)
      GO TO 8
C
C FORM NEW INVERSE HESSIAN
C
    6 CONTINUE
      DO 7 I= 1,NPARM
      DO 7 J= 1,NPARM
      YK(J) = Z(J)/CK
7     HN(I,J) = Z(I) * YK(J) + HO(I,J)
C
C COMPUTE NEW DIRECTIONS
C
    8 CONTINUE
```

```
      DO 9 I= 1,NPARM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.DO
CIBM
      HGR(I)= SOSCAP(HN,GRN,SUM,NPARM,MAXDIM,1,I,1)
    9 DELX(I)= -HGR(I)
C
C TEST SIZE OF HG/G
C IF TOO SMALL RESCALE H
C
   10 CONTINUE
      CALL NRM2(DELX,HG,NPARM)
      CALL NRM2(GRN,G,NPARM)
      EPS= 1.0E-08
      IF(G.LT.1.0E-04) GO TO 15
      TEST= HG/G
      IF(TEST.GT.EPS) GO TO 15
C
C RESCALE H AND DELX - VIA ALPHA
C
      WRITE(ITAPEW,302) TEST
      WRITE(ITAPEN,302) TEST
      F= 10.*EPS/TEST
      DO 11 I= 1,NPARM
      DO 11 J= 1,NPARM
   11 HN(I,J)= F*HN(I,J)
      STEP= F*STEP
   15 CONTINUE
      WRITE(ITAPEW,303)
      WRITE(ITAPEN,303)
      DO 101 I=1,NPARM
      WRITE(ITAPEW,300) (HN(I,J), J=1,NPARM)
  101 WRITE(ITAPEN,300) (HN(I,J), J=1,NPARM)
      WRITE(ITAPEW,310)
      WRITE(ITAPEW,300) (HGR(I), I=1,NPARM)
      WRITE(ITAPEN,300) (HGR(I), I=1,NPARM)
      RETURN
C
  299 FORMAT(//5X,19HOLD INVERSE HESSIAN/)
  300 FORMAT (5(2X,1PE12.5))
  301 FORMAT(1HO,5X,12HCK AND Z2 = ,E15.5,2X,E15.5)
  302 FORMAT(1HO,5X,6HHG/G= ,E15.5,21H.  RESCALE H AND DELX)
  303 FORMAT(//5X,33HNEW INVERSE HESSIAN AND DIRECTION/)
  304 FORMAT(//5X,4HW = ,E10.3,23H  RESET INVERSE HESSIAN)
  305 FORMAT(1HO,5X,49HZ = O, SET NEW INVERSE HESSION EQUAL TO OLD VALUE
     1)
  306 FORMAT(1HO,5X,13HPREVIOUS MOVE,//)
  307 FORMAT(1HO,5X,10HDELTA GRAD,//)
  308 FORMAT(1HO,5X,17HHOLD*(DELTA GRAD) ,//)
  309 FORMAT(1HO,5X,15HZ= DELTAX-HOLDG,//)
  310 FORMAT(1HO)
      END
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  MURT             1        154

VARIABLES      SN  TYPE            RELOCATION
   720  CK        REAL                            REFS        64     81     90    109  DEFINED     42
   257  DELG      REAL      ARRAY     POWELL      REFS         7     33     42     56  DEFINED     21
   106  DELX      REAL      ARRAY     POWELL      REFS         7     35     54    129  DEFINED     20    123
   726  EPS       REAL                            REFS        80     91    134    140  DEFINED     79     89
                                                   131
   732  F         REAL                            REFS       143    144 DEFINED   140
   731  G         REAL                            REFS       130    132    133
   214  GRN       REAL      ARRAY     POWELL      REFS         7     21    122    130
   151  GRO       REAL      ARRAY     POWELL      REFS         7     21     88
   730  HG        REAL                            REFS       129    133
  5207  HGR       REAL      ARRAY     POWELL      REFS         7    123    152    153  DEFINED    122
  2676  HN        REAL      ARRAY     POWELL      REFS         7    122    143    149    150
                                               DEFINED        75    101    110    143
   365  HO        REAL      ARRAY     POWELL      REFS         7     33     59     75    101    110
   733  HY        REAL      ARRAY                 REFS        11     35     61 DEFINED     33
   716  I         INTEGER                         REFS      3*20   3*21   2*33   3*35     54     56     59
                                                    61        63   2*75  3*101  3*110  2*122  2*123  2*143
                                                   149       150    152    153 DEFINED     19     26     34
                                                    54        56     58     61     63     73     98    107
                                                   115       141    148    152    153
  5254  ICN       INTEGER             POWELL      REFS         7
  5253  ICONV     INTEGER             POWELL      REFS         7
     0  ICYCLE    INTEGER             STRCLU      REFS         6
     1  ISTEP     INTEGER             STRCLU      REFS         6     17
   723  ITAP      INTEGER                      DEFINED        50     67 I/O REFS    53     54     55     56
                                                    57        59     60     61     62     63     64
   715  ITAPEN    INTEGER                         REFS        67 DEFINED     16 I/O REFS   72     97    139
                                                   147       150    153
     0  ITAPES    INTEGER   ARRAY     CTAPES      REFS         5     15     16
   714  ITAPEW    INTEGER                         REFS        50 DEFINED     15 I/O REFS   71     96    138
                                                   146       149    151    152
   725  J         INTEGER                         REFS        59   2*75  2*100  3*101  2*109  3*110  2*143
                                                   149       150 DEFINED     59     74     99    108    142
                                                   149       150
   724  LOOP      INTEGER                         REFS        65 DEFINED     51     66
     0  MAXDIM    INTEGER             MAX         REFS         9     33    122
     2  M1        INTEGER             STRCLU      REFS         6
     3  M2        INTEGER             STRCLU      REFS         6
     4  M3        INTEGER             STRCLU      REFS         6
     5  M4        INTEGER             STRCLU      REFS         6
  5252  NPARM     INTEGER             POWELL      REFS         7     19     26     33     34     42     47
                                                    54        56     58     59     61     63     73     74
                                                    88        98     99    107    108    115    122    129
                                                   130       141    142    148    149    150    152    153
     0  STEP      REAL                F.P.        REFS       144 DEFINED      1    144
    11  STPOLD    REAL                STRCLU      REFS         6
   717  SUM       REAL                            REFS        33     42     88    122  DEFINED     28     37
                                                    83       117
   727  TEST      REAL                            REFS        81    134    138    139    140
                                               DEFINED        80    133
```

```
VARIABLES      SN  TYPE          RELOCATION
    1  ISTEP       INTEGER              STRCLU       REFS         2
  425  ITAPEN      INTEGER                         DEFINED       10     I/O REFS      27        39        53        72        82
                                                      88         98       105        109
    0  ITAPES      INTEGER    ARRAY     CTAPES       REFS         3         9         10
  424  ITAPEW      INTEGER                         DEFINED        9     I/O REFS      26        38        52        71        81
                                                      87         97       104        108
    2  M1          INTEGER              STRCLU       REFS         2
    3  M2          INTEGER              STRCLU       REFS         2
    4  M3          INTEGER              STRCLU       REFS         2
    5  M4          INTEGER              STRCLU       REFS         2
 5252  NPARM       INTEGER              POWELL       REFS         4        19         46        61       117
  446  RTMAX       REAL                              REFS      2*92        96    DEFINED        89
  447  RTMIN       REAL                              REFS      2*91        94    DEFINED        90
    0  STEP        REAL                  F.P.        REFS        62        63         68        94        96       106       107
                                                     110    DEFINED         1         50        94        96       110
   11  STPOLD      REAL                 STRCLU       REFS         2
   10  VNEW        REAL                 STRCLU       REFS         2        68        106   DEFINED       115
    0  VNSAVE      REAL                 VSAVE        REFS         7    DEFINED       116
    7  VOLD        REAL                 STRCLU       REFS         2        68        106       115
    1  VOSAVE      REAL                 VSAVE        REFS         7       116
    6  VS          REAL                 STRCLU       REFS         2
  441  W           REAL                              REFS        85        86    DEFINED        74
  440  W2          REAL                              REFS        70        74    DEFINED        69
  443  X           REAL                              REFS        85        86    DEFINED        84
   43  XN          REAL       ARRAY     POWELL       REFS         4        22         47
    0  XO          REAL       ARRAY     POWELL       REFS         4        22         47
  437  Z           REAL                              REFS      2*69        78         84   DEFINED        68
  322  ZZ          REAL       ARRAY     POWELL       REFS         4
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS        REFERENCES
       SQRT        REAL      1 LIBRARY     74

INLINE FUNCTIONS    TYPE   ARGS         DEF LINE  REFERENCES
       ABS         REAL      1  INTRIN                23        80
       AMAX1       REAL      0  INTRIN                89
       AMIN1       REAL      0  INTRIN                41        90

STATEMENT LABELS              DEF LINE   REFERENCES
   34  1                         29         19        21        24
    0  2                         42         36
   73  3                         49         46        47
    0  4                         64         61
  134  5                         74         70
  151  6                         84         80
  173  7                         94         91
  175  8                         96         92
  177  9                         97         95
  204  10                       100         73        83        93
  224  11                       111         54        99
    0  12                       118        117
  104  20                        58         12        30
  344  200      FMT             121         71        72
  351  201      FMT             122         81        82
  356  202      FMT             123         87        88       108       109
  364  203      FMT             124         97        98
  370  204      FMT             125        104       105
```

```
            VNEW = VOLD                                                 LINESR   116
            VNSAVE = VOSAVE                                             LINESR   117
            DO 12 I= 1,NPARM                                            LINESR   118
         12 GRN(I)= GRO(I)                                              LINESR   119
      C                                                                 LINESR   120
      C   STEP - SIZE DECELERATOR.                                      LINESR   121
        200 FORMAT(1HO,10X,22HW SQUARED IS NEGATIVE.)                   LINESR   122
        201 FORMAT(1HO,10X,20HDENOMINATOR IS ZERO.)                     LINESR   123
        202 FORMAT(1HO,10X,5HA1 = ,1P1E10.3,5X,5HA2 = ,1P1E10.3)        LINESR   124
        203 FORMAT(1HO,10X,18HCUBIC FIT IS USED.)                       LINESR   125
        204 FORMAT(1HO,10X,22HQUADRATIC FIT IS USED.)                   LINESR   126
        205 FORMAT(1HO,10X,40HMOVE IS REDUCED TO JUST TOUCH CONSTRAINT. LINESR   127
          1        /,10X,11HNEW ALPHA= ,1P1E10.3)                       LINESR   128
        206 FORMAT(1HO,10X,8HVARIABLE,I4,29HHAS JUST MOVED TO CONSTRAINT , LINESR 129
          1        /,12X,5HDELX=,1P1E10.3)                              LINESR   130
            RETURN                                                      LINESR   131
            END                                                         LINESR   132
```

```
   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  LINESR         1         130

VARIABLES     SN  TYPE            RELOCATION
  432  ALPHA      REAL                            REFS       41      48      52      53  DEFINED      35      41
  434  ALPHA1     REAL                            REFS       41 DEFINED      40
  444  A1         REAL                            REFS       87      88      89      90      108     109     110
                                               DEFINED       85     107
  445  A2         REAL                            REFS       87      88      89      90  DEFINED      86
    O  CON        REAL       ARRAY    CONS        REFS        6      21
  257  DELG       REAL       ARRAY    POWELL      REFS        4
  106  DELX       REAL       ARRAY    POWELL      REFS        4      38      39      40       62      63
                                               DEFINED       48
  442  DEN        REAL                            REFS       80      85      86     107  DEFINED      78     106
  431  DIF        REAL                            REFS       23      24      26      27  DEFINED      22      23
  427  EPS        REAL                            REFS       24      80 DEFINED      18       79
  435  FD1        REAL                            REFS       62      68      69      78       84     106     107
                                               DEFINED       59      62
  436  FD2        REAL                            REFS       63      68      69      78  DEFINED      60      63
  214  GRN        REAL       ARRAY    POWELL      REFS        4      63 DEFINED     118
  151  GRO        REAL       ARRAY    POWELL      REFS        4      62     118
 5207  HGR        REAL       ARRAY    POWELL      REFS        4      40      48
 2676  HN         REAL       ARRAY    POWELL      REFS        4
  365  HO         REAL       ARRAY    POWELL      REFS        4
  430  I          INTEGER                         REFS       20      21    2*22      26       27      28      37
                                                  2*47     2*48    2*62    2*63   2*118  DEFINED      19      36
                                                    46       61     117
 5254  ICN        INTEGER             POWELL      REFS        4      12 DEFINED      11       51
 5253  ICONV      INTEGER             POWELL      REFS        4
    O  ICYCLE     INTEGER             STRCLU      REFS        2
  433  II         INTEGER                         REFS     2*38    2*39    2*40 DEFINED       37
  426  III        INTEGER                         REFS       25      28      30      36  DEFINED      17      25
  450  IPOINT     INTEGER    ARRAY                REFS        8      37 DEFINED      20       28
```

```
   20 CONTINUE                                                          LINESR    59
      FD1= 0.                                                           LINESR    60
      FD2= 0.                                                           LINESR    61
      DO 4 I= 1,NPARM                                                   LINESR    62
      FD1= FD1 + GRO(I)*DELX(I)/STEP                                    LINESR    63
      FD2= FD2 + GRN(I)*DELX(I)/STEP                                    LINESR    64
    4 CONTINUE                                                          LINESR    65
C                                                                       LINESR    66
C COMPUTE Z & W                                                         LINESR    67
C                                                                       LINESR    68
      Z = ( 3.0 * ( VOLD - VNEW )/STEP ) + FD1 + FD2                    LINESR    69
      W2 = Z * Z - FD1*FD2                                              LINESR    70
      IF( W2 .GE. 0.0 ) GO TO 5                                         LINESR    71
      WRITE(ITAPEW,200)                                                 LINESR    72
      WRITE(ITAPEN,200)                                                 LINESR    73
      GO TO 10                                                          LINESR    74
    5 W = SQRT( W2 )                                                    LINESR    75
C                                                                       LINESR    76
C COMPUTE NEW ALPHA/OLD                                                 LINESR    77
C                                                                       LINESR    78
      DEN= 2.0*Z + FD1 + FD2                                            LINESR    79
      EPS= 1.0E-08                                                      LINESR    80
      IF(ABS(DEN).GT.EPS) GO TO 6                                       LINESR    81
      WRITE(ITAPEW,201)                                                 LINESR    82
      WRITE(ITAPEN,201)                                                 LINESR    83
      GO TO 10                                                          LINESR    84
    6 X= Z + FD1                                                        LINESR    85
      A1= (X + W)/DEN                                                   LINESR    86
      A2= (X - W)/DEN                                                   LINESR    87
      WRITE(ITAPEW,202) A1,A2                                           LINESR    88
      WRITE(ITAPEN,202) A1,A2                                           LINESR    89
      RTMAX = AMAX1( A1,A2 )                                            LINESR    90
      RTMIN = AMIN1( A1,A2 )                                            LINESR    91
      IF( RTMIN .GT. 0.0 .AND. RTMIN .LT. 1.0 ) GO TO 7                 LINESR    92
      IF( RTMAX .GT. 0.0 .AND. RTMAX .LT. 1.0 ) GO TO 8                 LINESR    93
      GO TO 10                                                          LINESR    94
    7 STEP = STEP * RTMIN                                               LINESR    95
      GO TO 9                                                           LINESR    96
    8 STEP = STEP * RTMAX                                               LINESR    97
    9 WRITE(ITAPEW,203)                                                 LINESR    98
      WRITE(ITAPEN,203)                                                 LINESR    99
      GO TO 11                                                          LINESR   100
   10 CONTINUE                                                          LINESR   101
C                                                                       LINESR   102
C   QUADRATIC INTERPOLATION.                                            LINESR   103
C                                                                       LINESR   104
      WRITE(ITAPEW,204)                                                 LINESR   105
      WRITE(ITAPEN,204)                                                 LINESR   106
      DEN= 2.0*(VNEW - VOLD - FD1*STEP)                                 LINESR   107
      A1= -FD1*STEP/DEN                                                 LINESR   108
      WRITE(ITAPEW,202) A1                                              LINESR   109
      WRITE(ITAPEN,202) A1                                              LINESR   110
      STEP= A1*STEP                                                     LINESR   111
   11 CONTINUE                                                          LINESR   112
C                                                                       LINESR   113
C   REJECT CURRENT POINT. TAKE SMALLER STEP FROM PREVIOUS POINT.        LINESR   114
C                                                                       LINESR   115
```

```
      SUBROUTINE LINESR(STEP)                                          LINESR     2
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD     LINESR     3
      COMMON/CTAPES/ ITAPES(50)                                        LINESR     4
      COMMON/POWELL/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)   LINESR     5
     1             ,ZZ(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICONV,ICN LINESR     6
      COMMON/CONS/CON(35,4)                                            LINESR     7
      COMMON/ VSAVE / VNSAVE, VOSAVE                                   LINESR     8
      DIMENSION IPOINT(35)                                             LINESR     9
      ITAPEW= ITAPES(6)                                                LINESR    10
      ITAPEN= ITAPES(40)                                               LINESR    11
      ICN = 1                                                          LINESR    12
      IF(ICN.GT.O) GO TO 20                                            LINESR    13
C                                                                      LINESR    14
C DETERMINE WHICH CONSTRAINED COMPONENTS                               LINESR    15
C OF XK WERE CONSTRAINED AT XK-1                                       LINESR    16
C                                                                      LINESR    17
      III= O                                                           LINESR    18
      EPS= 1.OE-03                                                     LINESR    19
      DO 1 I= 1,NPARM                                                  LINESR    20
      IPOINT(I)= O                                                     LINESR    21
      IF(CON(I,3) .GT. O.) GO TO 1                                     LINESR    22
      DIF= XN(I)-XO(I)                                                 LINESR    23
      DIF= ABS(DIF)                                                    LINESR    24
      IF(DIF.LT.EPS) GO TO 1                                           LINESR    25
      III= III + 1                                                     LINESR    26
      WRITE(ITAPEW,206) I,DIF                                          LINESR    27
      WRITE(ITAPEN,206) I,DIF                                          LINESR    28
      IPOINT(III)= I                                                   LINESR    29
    1 CONTINUE                                                         LINESR    30
      IF(III .EQ. O) GO TO 20                                          LINESR    31
C                                                                      LINESR    32
C COMPUTE MINIMUM ALPHA REQUIRED                                       LINESR    33
C TO BRING ONE OF THESE TO CONSTRAINT                                  LINESR    34
C                                                                      LINESR    35
      ALPHA= 1.                                                        LINESR    36
      DO 2 I= 1,III                                                    LINESR    37
      II= IPOINT(I)                                                    LINESR    38
      WRITE(ITAPEW,206) II,DELX(II)                                    LINESR    39
      WRITE(ITAPEN,206) II,DELX(II)                                    LINESR    40
      ALPHA1= -DELX(II)/HGR(II)                                        LINESR    41
      ALPHA= AMIN1(ALPHA,ALPHA1)                                       LINESR    42
    2 CONTINUE                                                         LINESR    43
C                                                                      LINESR    44
C COMPUTE NEW DELTA X USING ALPHA                                      LINESR    45
C                                                                      LINESR    46
      DO 3 I= 1,NPARM                                                  LINESR    47
      IF(XO(I) .EQ. XN(I)) GO TO 3                                     LINESR    48
      DELX(I)= -ALPHA*HGR(I)                                           LINESR    49
    3 CONTINUE                                                         LINESR    50
      STEP= 1.O                                                        LINESR    51
      ICN= 1                                                           LINESR    52
      WRITE(ITAPEW,205) ALPHA                                          LINESR    53
      WRITE(ITAPEN,205) ALPHA                                          LINESR    54
      GO TO 11                                                         LINESR    55
C                                                                      LINESR    56
C COMPUTE DV/DALPHA FOR CUBIC INTERPOLATION                            LINESR    57
C                                                                      LINESR    58
```

```
LOOPS  LABEL     INDEX       FROM-TO      LENGTH    PROPERTIES
   24  111       I            31  35         10B              EXT REFS
   36  13        I            38  46         23B              NOT INNER
   44  12        K            41  42          4B     INSTACK
   65  14        I            52  54          2B     INSTACK
  163  330       I           115 117          3B     INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       EPSIL          1               0 EPS     (1)
       JGL         4505               0 JSET    (50)              50 JDIM    (1)              51 G       (1750)
                                   1801 LMK     (2500)          4301 BCOEF   (50)           4351 MSTAR   (1)
                                   4352 NOTJ    (50)            4402 NOTDIM  (1)            4403 LINDEP  (50)
                                   4453 LDDIM   (1)             4454 NOTACT  (50)           4504 NDIM    (1)
       CTAPES        50               0 ITAPES  (50)
       POWELL      2732               0 XO      (35)              35 XN      (35)             70 DELX    (35)
                                    105 GRO     (35)             140 GRN     (35)            175 DELG    (35)
                                    210 Z       (35)             245 HO      (1225)         1470 HN      (1225)
                                   2695 HGR     (35)            2730 NPARM   (1)            2731 ICON    (1)
       MAX            1               0 MAXDIM  (1)
       NEWCON        51               0 JNEW    (50)              50 NEWDIM  (1)

STATISTICS
  PROGRAM LENGTH                    647B      423
  CM LABELED COMMON LENGTH        16254B     7340
        52000B CM USED
```

```
VARIABLES     SN  TYPE           RELOCATION
                                                DEFINED       84
  474  PSUM       REAL                            REFS        84    DEFINED      83
    0  STEP       REAL                 F.P.       REFS       140    DEFINED       1
  473  SUM        REAL                            REFS        83      125   DEFINED       78        120
   43  XN         REAL        ARRAY    POWELL     REFS         7
    0  XO         REAL        ARRAY    POWELL     REFS         7
  322  Z          REAL        ARRAY    POWELL     REFS         7
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       ADDCON                 3                34
       AORDER                 4                70
       DELCON                 1               100
       EXIT                   0               138       145
       GRAPRO                 0                92       127
       HYPER                  1                63
       INSECT                 1               140
       LAGMUL                 1                58
       LDFIX                  0               109
       LMKP1                  0                28
       NRM2                   3                93       134       135
       SETJGL                 0                24
       SOSCAP     REAL        8                83       125
       SQRT       REAL        1 LIBRARY        84

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE  REFERENCES
       ABS        REAL        1  INTRIN                 73

STATEMENT LABELS                DEF LINE    REFERENCES
  347  2        FMT                147          59
  353  3        FMT                148          64
  357  4        FMT                149          85
  373  6        FMT                151         126
  377  7        FMT                152         141
  403  8        FMT  NO REFS       153
  414  9        FMT                155          20
   14  10                           23          21
   17  11                           27          22
    0  12                           42          41
   56  13                           46          38        43
    0  14                           54          52
   70  15                           57          26       111
  150  33                          102          99
  167  34                          118         103
  177  35                          132          25
  212  36                          139         133       136
  22[illegible]  40                143          94
  132  41                           91          86
  137  42                           95          87
  223  50                          146         142
  421  101      FMT                156         137
  430  103      FMT                157         144
  441  104      FMT                159          29
  445  105      FMT                160         110
    0  111                          35          31
   34  115                          36          30
    0  330                         117         115
```

```
ENTRY POINTS     DEF LINE      REFERENCES
    3  CONSTR          1         161

VARIABLES      SN  TYPE             RELOCATION
10315  BCOEF       REAL       ARRAY    JGL        REFS        4
  472  BETA        REAL                           REFS       85        86        97   DEFINED       73
  257  DELG        REAL       ARRAY    POWELL     REFS        7
  106  DELX        REAL       ARRAY    POWELL     REFS        7      2*83        93       125      134
                                               DEFINED      116
    0  EPS         REAL                EPSIL      REFS        3      2*86        94     2*136   DEFINED      18
   63  G           REAL       ARRAY    JGL        REFS        4
  502  GNORM       REAL                           REFS      135       136
  214  GRN         REAL       ARRAY    POWELL     REFS        7       125       135
  151  GRO         REAL       ARRAY    POWELL     REFS        7
 5207  HGR         REAL       ARRAY    POWELL     REFS        7       116
 2676  HN          REAL       ARRAY    POWELL     REFS        7
  365  HO          REAL       ARRAY    POWELL     REFS        7
  456  I           INTEGER                        REFS       33        39        45        53     2*116
                                               DEFINED       31        38        52       115
 5253  ICON        INTEGER             POWELL     REFS        7        42   DEFINED        39
  462  IND         INTEGER                        REFS       44        45        50   DEFINED       37        44
  503  IPERM       INTEGER    ARRAY               REFS       12        70        71
    0  ISTEP       INTEGER              F.P.      REFS       21   DEFINED         1
    0  ITAPES      INTEGER    ARRAY    CTAPES     REFS        6        12        19
  455  ITAPEW      INTEGER                     DEFINED       19  I/O REFS        20        29        59        64        85
                                                  110       126       137       141       144
  463  ITEST       INTEGER                        REFS       43   DEFINED        40        42
  465  I1          INTEGER                        REFS       52   DEFINED        51
   62  JDIM        INTEGER             JGL        REFS        4        22        25        69       111       133
  477  JDPNT       INTEGER                        REFS       99       100   DEFINED        96        97
  470  JM          INTEGER                        REFS       72      3*73      6*85        97   DEFINED       71
  471  JMAX     *  INTEGER                     DEFINED       72
  460  JN          INTEGER                        REFS       34   DEFINED        33
    0  JNEW        INTEGER    ARRAY    NEWCON     REFS       10        33
    0  JSET        INTEGER    ARRAY    JGL        REFS        4        72
  464  K           INTEGER                        REFS       42   DEFINED        41
  457  KALL        INTEGER                        REFS       34   DEFINED        32
  500  KDEL        INTEGER                        REFS      103   DEFINED        98       101
  565  LAM         REAL       ARRAY               REFS       13        58        63        70        73        85
  454  LAMMAX   *  REAL      *UNDEF               REFS       13
  461  LD       *  INTEGER                        REFS       34
10545  LDDIM       INTEGER             JGL        REFS        4        41       109       110
10463  LINDEP      INTEGER    ARRAY    JGL        REFS        4        42
 3411  LMK         REAL       ARRAY    JGL        REFS        4        13        73        85
    0  MAXDIM      INTEGER             MAX        REFS        9
  467  MINUSN      INTEGER                        REFS       70   DEFINED        69
10377  MSTAR       INTEGER             JGL        REFS        4        52
  466  NCON        INTEGER                        REFS       70   DEFINED        68
10630  NDIM        INTEGER             JGL        REFS        4        51   DEFINED        50
   62  NEWDIM      INTEGER             NEWCON     REFS       10        30        31
10546  NOTACT      INTEGER    ARRAY    JGL        REFS        4   DEFINED        45        53
10462  NOTDIM      INTEGER             JGL        REFS        4        38
10400  NOTJ        INTEGER    ARRAY    JGL        REFS        4        39        45
 5252  NPARM       INTEGER             POWELL     REFS        7        83        93       115       125       134       135
  501  PG          REAL                           REFS      126       127   DEFINED       125
  476  PGNORM      REAL                           REFS       93        94
  475  PNORM       REAL                           REFS       85        86        97       134       136
```

```
               DO 330 I=1,NPARM                                          CONSTR     116
               DELX(I) = -HGR(I)                                         CONSTR     117
         330   CONTINUE                                                  CONSTR     118
         34    CONTINUE                                                  CONSTR     119
         CCDL                                                            CONSTR     120
               SUM = 0.0                                                 CONSTR     121
         CCDC                                                            CONSTR     122
         CIBM                                                            CONSTR     123
         C     SUM = 0.D0                                                CONSTR     124
         CIBM                                                            CONSTR     125
               PG = SOSCAP(DELX,GRN,SUM,NPARM,1,1,1,1)                   CONSTR     126
               WRITE(ITAPEW,6) PG                                        CONSTR     127
               IF(PG.GE.0.0) CALL GRAPRO                                 CONSTR     128
         C                                                               CONSTR     129
         C     COMPUTE INTERSECTION OF STEP WITH EACH CONSTRAINT NOT ALREADY   CONSTR     130
         C     IN JSET.                                                  CONSTR     131
         C                                                               CONSTR     132
         35    CONTINUE                                                  CONSTR     133
               IF(JDIM.NE.0) GO TO 36                                    CONSTR     134
               CALL NRM2(DELX,PNORM,NPARM)                               CONSTR     135
               CALL NRM2(GRN,GNORM,NPARM)                                CONSTR     136
               IF(PNORM.GT.EPS.OR.GNORM.GT.EPS) GO TO 36                 CONSTR     137
               WRITE(ITAPEW,101)                                         CONSTR     138
               CALL EXIT                                                 CONSTR     139
         36    CONTINUE                                                  CONSTR     140
               CALL INSECT(STEP)                                         CONSTR     141
               WRITE(ITAPEW,7)                                           CONSTR     142
               GO TO 50                                                  CONSTR     143
         40    CONTINUE                                                  CONSTR     144
               WRITE(ITAPEW,103)                                         CONSTR     145
               CALL EXIT                                                 CONSTR     146
         50    CONTINUE                                                  CONSTR     147
             2 FORMAT(1H0,10X,11HEXIT LAGMUL)                            CONSTR     148
             3 FORMAT(1H0,10X,10HEXIT HYPER)                             CONSTR     149
             4 FORMAT(1H0,10X,4HLAM(,I2,4H) = ,1P1E12.5,5X,4HLMK(,I2,1H,,I2,4H) = CONSTR     150
              A ,1P1E12.5,5X,7HBETA = ,1P1E12.5,5X,8HPNORM = ,1P1E12.5)  CONSTR     151
             6 FORMAT(1H0,10X,5HPG = ,1P1E12.5)                          CONSTR     152
             7 FORMAT(1H0,10X,11HEXIT INSECT)                            CONSTR     153
             8 FORMAT(1H0,10X,/10H STEPSS = ,1P1E12.5,3X,8HRATIO = ,1P1E12.5,3X,  CONSTR     154
              A7HSTEP = ,1P1E12.5)                                       CONSTR     155
             9 FORMAT(1H0,/,10X,26HENTERING SUBROUTINE CONSTR)           CONSTR     156
           101 FORMAT(1H0,10X,46HUNCONSTRAINED MINIMUM REACHED, JOB TERMINATING)  CONSTR     157
           103 FORMAT(1H0,10X,62HMINIMUM REACHED ACCORDING TO KUHN-TUCKER TEST, J CONSTR     158
              AOB TERMINATING)                                           CONSTR     159
           104 FORMAT(1H0,10X,13HLEAVING LMKP1)                          CONSTR     160
           105 FORMAT(1H0,10X,13HLEAVING LDFIX)                          CONSTR     161
               RETURN                                                    CONSTR     162
               END                                                       CONSTR     163
```

SYMBOLIC REFERENCE MAP (R=3)

```
      CALL LAGMUL(LAM)
      WRITE(ITAPEW,2)
C
C     PROJECT UNCONSTRAINED STEP ONTO INTERSECTION OF HYPERPLANES
C
      CALL HYPER(LAM)
      WRITE(ITAPEW,3)
C
C     FORM BETA
C
      NCON = 1
      MINUSN = -JDIM
      CALL AORDER(LAM,MINUSN,IPERM,NCON)
      JM = IPERM(1)
      JMAX = JSET(JM)
      BETA = (LAM(JM)/ABS(LMK(JM,JM))) * .5
C
C     DO KUHN-TUCKER TEST TO SEE IF MINIMUM HAS BEEN ACHEIVED
C
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      PSUM = SOSCAP(DELX,DELX,SUM,NPARM,1,1,1,1)
      PNORM = SQRT(PSUM)
      WRITE(ITAPEW,4) JM,LAM(JM),JM,JM,LMK(JM,JM),BETA,PNORM
      IF(PNORM.LE.EPS .AND. BETA.LE.EPS) GO TO 41
      GO TO 42
C
C COMPUTE A GRADIENT PROJECTION TO MAKE SURE IT IS SMALL
C
   41 CONTINUE
      CALL GRAPRO
      CALL NRM2(DELX,PGNORM,NPARM)
      IF(PGNORM.LE.EPS) GO TO 40
   42 CONTINUE
      JDPNT = 0
      IF(PNORM.LE.BETA) JDPNT = JM
      KDEL = 0
      IF(JDPNT.EQ.0) GO TO 33
      CALL DELCON(JDPNT)
      KDEL = 1
33    CONTINUE
      IF(KDEL.NE.1) GO TO 34
C
C     SINCE AT LEAST ONE CONSTRAINT HAS BEEN DELETED THE CONSTRAINTS
C     IN LINDEP MIGHT NOT BE LD ANYMORE.  AT THIS POINT, ATTEMPT TO
C     ADD ALL OF THEM AND RECALCULATE LINDEP.
C
      'F(LDDIM.NE.0) CALL LDFIX
      IF(LDDIM.NE.0) WRITE(ITAPEW,105)
      IF(JDIM.NE.0) GO TO 15
C
C     IF JDIM = 0, DELX = -HGR, IE. TAKE UNCONSTRAINED MOVE.
C
```

```
           SUBROUTINE CONSTR(ISTEP,STEP)                                  CONSTR   2
      C                                                                   CONSTR   3
           COMMON /EPSIL/ EPS                                             CONSTR   4
           COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)  CONSTR   5
          1         ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM CONSTR   6
           COMMON /CTAPES/ ITAPES                                         CONSTR   7
           COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35) CONSTR   8
          1            ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON      CONSTR   9
           COMMON /MAX/ MAXDIM                                            CONSTR  10
           COMMON /NEWCON /  JNEW(50),NEWDIM                              CONSTR  11
      C                                                                   CONSTR  12
           DIMENSION IPERM(50),ITAPES(50)                                 CONSTR  13
           REAL LMK,LAM(50),LAMMAX                                        CONSTR  14
      CIBM                                                                CONSTR  15
      C    REAL*8 SUM                                                     CONSTR  16
      CIBM                                                                CONSTR  17
      C                                                                   CONSTR  18
           EPS = 1.0E-4                                                   CONSTR  19
           ITAPEW = ITAPES(6)                                             CONSTR  20
           WRITE(ITAPEW,9)                                                CONSTR  21
           IF(ISTEP.EQ.1) GO TO 10                                        CONSTR  22
           IF(JDIM.NE.0) GO TO 11                                         CONSTR  23
      10   CONTINUE                                                       CONSTR  24
           CALL SETJGL                                                    CONSTR  25
           IF(JDIM.EQ.0) GO TO 35                                         CONSTR  26
           GO TO 15                                                       CONSTR  27
      11   CONTINUE                                                       CONSTR  28
           CALL LMKP1                                                     CONSTR  29
           WRITE(ITAPEW,104)                                              CONSTR  30
           IF(NEWDIM.EQ.0) GO TO 115                                      CONSTR  31
           DO 111 I=1,NEWDIM                                              CONSTR  32
           KALL = 1                                                       CONSTR  33
           JN = JNEW(I)                                                   CONSTR  34
           CALL ADDCON(JN,KALL,LD)                                        CONSTR  35
      111  CONTINUE                                                       CONSTR  36
      115  CONTINUE                                                       CONSTR  37
           IND = 0                                                        CONSTR  38
           DO 13 I=1,NOTDIM                                               CONSTR  39
           ICON = NOTJ(I)                                                 CONSTR  40
           ITEST = 0                                                      CONSTR  41
           DO 12 K=1,LDDIM                                                CONSTR  42
      12   IF(LINDEP(K).EQ.ICON) ITEST = 1                                CONSTR  43
           IF(ITEST.EQ.1) GO TO 13                                        CONSTR  44
           IND = IND + 1                                                  CONSTR  45
           NOTACT(IND) = NOTJ(I)                                          CONSTR  46
      13   CONTINUE                                                       CONSTR  47
      C                                                                   CONSTR  48
      C    ZERO OUT REMAINING PORTION OF NOTACT                           CONSTR  49
      C                                                                   CONSTR  50
           NDIM = IND                                                     CONSTR  51
           I1 = NDIM + 1                                                  CONSTR  52
           DO 14 I=I1,MSTAR                                               CONSTR  53
           NOTACT(I) = 0                                                  CONSTR  54
      14   CONTINUE                                                       CONSTR  55
      C    COMPUTE LAGRANGE MULTIPLIERS                                   CONSTR  56
      C                                                                   CONSTR  57
      15   CONTINUE                                                       CONSTR  58
```

```
STATEMENT LABELS                     DEF LINE   REFERENCES
   30  1                                19         10
    0  2                                15         12        13
    0  3                                22         20

LOOPS  LABEL      INDEX      FROM-TO      LENGTH      PROPERTIES
   14  2          I          12 15         14B                  NOT INNER
   21  2          J          13 15          3B         INSTACK
   33  3          I          20 22          4B         INSTACK

COMMON BLOCKS     LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES          1             0 ITAPES (1)
       POWELL       2733             0 XO      (35)         35 XN      (35)          70 DELX    (35)
                                   105 GRO     (35)        140 GRN     (35)         175 DELG    (35)
                                   210 Z       (35)        245 HO      (1225)      1470 HN      (1225)
                                  2695 HGR     (35)       2730 NPARM   (1)         2731 ICONV   (1)
                                  2732 ICN     (1)

STATISTICS
  PROGRAM LENGTH                   51B        41
  CM LABELED COMMON LENGTH       5256B      2734
          52000B CM USED
```

```
      SUBROUTINE USTEP(STEP)                                          USTEP    2
      COMMON/CTAPES/ ITAPES                                           USTEP    3
      COMMON/POWELL/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)  USTEP    4
     1          ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICONV,ICN    USTEP    5
C                                                                     USTEP    6
C TEST ALPHA TO DETERMINE IF                                          USTEP    7
C HESSIAN NEEDS TO BE RESCALED                                        USTEP    8
C                                                                     USTEP    9
      EPS= 1.0E-08                                                    USTEP   10
      IF (STEP.GE. EPS) GO TO 1                                       USTEP   11
      F= 10.*EPS/STEP                                                 USTEP   12
      DO 2 I= 1,NPARM                                                 USTEP   13
      DO 2 J= 1,NPARM                                                 USTEP   14
      HN(I,J)= HN(I,J)/F                                              USTEP   15
    2 CONTINUE                                                        USTEP   16
C                                                                     USTEP   17
C MAKE UNCONSTRAINED STEP                                             USTEP   18
C                                                                     USTEP   19
    1 CONTINUE                                                        USTEP   20
      DO 3 I= 1,NPARM                                                 USTEP   21
      DELX(I)= STEP*DELX(I)                                           USTEP   22
    3 XN(I)= XO(I) + DELX(I)                                          USTEP   23
      RETURN                                                          USTEP   24
      END                                                             USTEP   25
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3 USTEP           1            23

VARIABLES      SN  TYPE            RELOCATION
  257 DELG         REAL        ARRAY    POWELL      REFS      3
  106 DELX         REAL        ARRAY    POWELL      REFS      3        21        22   DEFINED      21
   43 EPS          REAL                             REFS     10        11   DEFINED         9
   44 F            REAL                             REFS     14   DEFINED        11
  214 GRN          REAL        ARRAY    POWELL      REFS      3
  151 GRO          REAL        ARRAY    POWELL      REFS      3
 5207 HGR          REAL        ARRAY    POWELL      REFS      3
 2676 HN           REAL        ARRAY    POWELL      REFS      3        14   DEFINED        14
  365 HO           REAL        ARRAY    POWELL      REFS      3
   45 I            INTEGER                          REFS   2*14      2*21      3*22   DEFINED      12      20
 5254 ICN          INTEGER              POWELL      REFS      3
 5253 ICONV        INTEGER              POWELL      REFS      3
    0 ITAPES       INTEGER              CTAPES      REFS      2
   46 J            INTEGER                          REFS   2*14   DEFINED        13
 5252 NPARM        INTEGER              POWELL      REFS      3        12        13        20
    0 STEP         REAL                  F.P.       REFS     10        11        21   DEFINED       1
   43 XN           REAL        ARRAY    POWELL      REFS      3   DEFINED        22
    0 XO           REAL        ARRAY    POWELL      REFS      3        22
  322 Z            REAL        ARRAY    POWELL      REFS      3
```

```
LOOPS  LABEL   INDEX    FROM-TO     LENGTH   PROPERTIES
  16   1       I         19  22        6B     INSTACK
  26   2       I         26  33        7B              EXT REFS
  37   3       I         34  35        3B     INSTACK
  74   100     I         58  59       20B              EXT REFS  NOT INNER
  77           J         59  59       11B              EXT REFS
 150   25      I         73  76       14B              NOT INNER
 155   25      J         74  76        3B     INSTACK
 205   5       I         98 101       17B              NOT INNER
 213   5       J         99 101        6B     INSTACK
 226   7       I        107 110       17B              NOT INNER
 234   7       J        108 110        6B     INSTACK
 246   9       I        115 123        7B              EXT REFS
 277   11      I        141 143       14B              NOT INNER
 304   11      J        142 143        3B     INSTACK
 321   101     I        148 150       35B              EXT REFS  NOT INNER
 324           J        149 149       11B              EXT REFS
 341           J        150 150       11B              EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50            0 ITAPES (50)
       STRCLU       10            0 ICYCLE (1)              1 ISTEP  (1)              2 M1     (1)
                                  3 M2     (1)              4 M3     (1)              5 M4     (1)
                                  6 VS     (1)              7 VOLD   (1)              8 VNEW   (1)
                                  9 STPOLD (1)
       POWELL     2733            0 XO     (35)            35 XN     (35)            70 DELX   (35)
                                105 GRO    (35)           140 GRN    (35)           175 DELG   (35)
                                210 Z      (35)           245 HO     (1225)        1470 HN     (1225)
                               2695 HGR    (35)          2730 NPARM  (1)           2731 ICONV  (1)
                               2732 ICN    (1)
       MAX           1            0 MAXDIM (1)
       MURTS        35            0 YK     (35)

STATISTICS
  PROGRAM LENGTH                776B     510
  CM LABELED COMMON LENGTH     5415B    2829
          52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
   10  VNEW        REAL                STRCLU      REFS       6
    7  VOLD        REAL                STRCLU      REFS       6
    6  VS          REAL                STRCLU      REFS       6
  721  W           REAL                            REFS      47      2*48      70       90       91       96       97
                                                 DEFINED     88        90
   43  XN          REAL       ARRAY    POWELL      REFS       7        20
    0  XO          REAL       ARRAY    POWELL      REFS       7        20
    0  YK          REAL       ARRAY    MURTS       REFS      10       101     110   DEFINED     100      109
  322  Z           REAL       ARRAY    POWELL      REFS       7        42      47       63       88      100      101
                                                    109     110   DEFINED      35
  722  Z2          REAL                            REFS      64        80     100   DEFINED      48

FILE NAMES        MODE
       TAPE6      FMT                   WRITES      13
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
       NRM2                 3           47     129     130
       SOSCAP      REAL     8           33      42      88     122

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS         REAL     1  INTRIN              81

STATEMENT LABELS                 DEF LINE    REFERENCES
    0  1                            22          19
    0  2                            33          26
    0  3                            35          34
  200  4                            95          81
    0  5                           101          98      99
  225  6                           106          91
    0  7                           110         107     108
  245  8                           114          17      77     102
    0  9                           123         115
    0  10         INACTIVE         128
    0  11                          143         141     142
  314  15                          145         132     134
   53  20                           52          68
  141  21                           69          65
    0  25                           76          73      74
  164  30                           78          70
    0  100                          59          58
    0  101                         150         148
  617  299       FMT               156          57
  623  300       FMT               157          54      56      59      61      63     149     150     152     153
  626  301       FMT               158          64
  633  302       FMT               159         138     139
  641  303       FMT               160         146     147
  647  304       FMT               161          96      97
  655  305       FMT               162          71      72
  664  306       FMT               164          53
  670  307       FMT               165          55
  674  308       FMT               166          60
  700  309       FMT               167          62
  704  310       FMT               168         151
  456  400       FMT                14          13
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  375  205      FMT             126         52        53
  406  206      FMT             128         26        27        38        39

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   15  1        I           19  29        22B              EXT REFS
   42  2        I           36  42        23B              EXT REFS
   67  3        I           46  49         5B     INSTACK
  110  4        I           61  64         7B     INSTACK
  232  12       I          117 118         3B     INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       STRCLU       10              0 ICYCLE (1)             1 ISTEP  (1)              2 M1      (1)
                                    3 M2     (1)             4 M3     (1)              5 M4      (1)
                                    6 VS     (1)             7 VOLD   (1)              8 VNEW    (1)
                                    9 STPOLD (1)
       CTAPES       50              0 ITAPES (50)
       POWELL     2733              0 XO     (35)           35 XN     (35)             70 DELX    (35)
                                  105 GRO    (35)          140 GRN    (35)            175 DELG    (35)
                                  210 ZZ     (35)          245 HO     (1225)         1470 HN      (1225)
                                 2695 HGR    (35)         2730 NPARM  (1)            2731 ICONV   (1)
                                 2732 ICN    (1)
       CONS        140              0 CON    (140)
       VSAVE         2              0 VNSAVE (1)             1 VOSAVE (1)

STATISTICS
  PROGRAM LENGTH                 515B     333
  CM LABELED COMMON LENGTH      5567B    2935
         52000B CM USED
```

```
   1              FUNCTION SOSCAP(X,Y,S,N,IX,IY,ISX,ISY)                           SOSCAP      2
                  DIMENSION X(1),Y(1)                                              SOSCAP      3
            CIBM                                                                   SOSCAP      4
            C     DOUBLE PRECISION S,SOSCAP                                        SOSCAP      5
   5        CIBM                                                                   SOSCAP      6
                  IF( N ) 120 , 120 , 100                                          SOSCAP      7
              100 JX = ISX                                                         SOSCAP      8
                  JY = ISY                                                         SOSCAP      9
                  DO 110 J = 1,N                                                   SOSCAP     10
  10              S = S + DBLE( X (JX) ) * DBLE( Y (JY) )                          SOSCAP     11
                  JX = JX + IX                                                     SOSCAP     12
              110 JY = JY + IY                                                     SOSCAP     13
              120 SOSCAP = S                                                       SOSCAP     14
                  RETURN                                                           SOSCAP     15
  15              END                                                              SOSCAP     16


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    4  SOSCAP          1          14

VARIABLES       SN  TYPE            RELOCATION
    0  ISX          INTEGER              F.P.       REFS       7  DEFINED       1
    0  ISY          INTEGER              F.P.       REFS       8  DEFINED       1
    0  IX           INTEGER              F.P.       REFS      11  DEFINED       1
    0  IY           INTEGER              F.P.       REFS      12  DEFINED       1
   41  J          * INTEGER                      DEFINED       9
   37  JX           INTEGER                         REFS      10        11  DEFINED       7       11
   40  JY           INTEGER                         REFS      10        12  DEFINED       8       12
    0  N            INTEGER              F.P.       REFS       6         9  DEFINED       1
    0  S            REAL                 F.P.       REFS      10        13  DEFINED       1       10
   36  SOSCAP       REAL                         DEFINED      13
    0  X            REAL         ARRAY   F.P.       REFS       2        10  DEFINED       1
    0  Y            REAL         ARRAY   F.P.       REFS       2        10  DEFINED       1

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       DBLE         DOUBLE    1  INTRIN                2*10

STATEMENT LABELS              DEF LINE    REFERENCES
    0  100          INACTIVE      7           6
    0  110                       12           9
   34  120                       13          2*6

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   23  110       J            9 12         6B      INSTACK

STATISTICS
  PROGRAM LENGTH                  45B       37
         52000B CM USED
```

```
                 SUBROUTINE INCONS                                                    INCONS    2
           C                                                                          INCONS    3
                 COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)       INCONS    4
                A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)              INCONS    5
                B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                   INCONS    6
                C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                   INCONS    7
                D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                           INCONS    8
                E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                              INCONS    9
                F      ,STRFDO(5,6),STRFDN(5,6)                                       INCONS   10
                 COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD         INCONS   11
                 COMMON /CTAPES/ ITAPES(50)                                           INCONS   12
                 COMMON /JGLV/ JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50),           INCONS   13
                1                MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,              INCONS   14
                2                NOTACT(50),NDIM                                      INCONS   15
                 COMMON /POWELV/ XO(35),XN(35),DELX(35),GRO(35),GRN(35),              INCONS   16
                1                  DELG(35),Z(35),HO(35,35),HN(35,35),HGR(35),        INCONS   17
                2                  NPARM,ICONV,ICN                                    INCONS   18
           C                                                                          INCONS   19
           CCDC                                                                       INCONS   20
                 COMMON /INCCOM/ GECS(35,50),BCOECS(50),NPMECS,MSTRECS                INCONS   21
           CCDC                                                                       INCONS   22
           C                                                                          INCONS   23
                 DIMENSION CORNM(10),CORNI(10),CORNS(10)                              INCONS   24
                 DIMENSION IPARM(6)                                                   INCONS   25
           C                                                                          INCONS   26
           CCDC                                                                       INCONS   27
                 LEVEL 3, GECS,BCOECS,NPMECS,MSTRECS                                  INCONS   28
           CCDC                                                                       INCONS   29
           C                                                                          INCONS   30
                 ITAPER = ITAPES(5)                                                   INCONS   31
                 ITAPEW = ITAPES(6)                                                   INCONS   32
           C                                                                          INCONS   33
           CIBM                                                                       INCONS   34
           C     ITAPJP = 60                                                          INCONS   35
           CIBM                                                                       INCONS   36
           C                                                                          INCONS   37
           C     ZERO OUT G MATRIX AND B VECTOR                                       INCONS   38
                 DO 5 I = 1,50                                                        INCONS   39
                 BCOEF(I) = 0.0                                                       INCONS   40
                 DO 5 J = 1,35                                                        INCONS   41
                 G(J,I) = 0.0                                                         INCONS   42
               5 CONTINUE                                                             INCONS   43
           C                                                                          INCONS   44
                 READ(ITAPER,100) ITOC1                                               INCONS   45
                 II=0                                                                 INCONS   46
                 MSTAR=0                                                              INCONS   47
                 NPARM=0                                                              INCONS   48
                 IF(ITOC1.EQ.0) GO TO 6                                               INCONS   49
           C                                                                          INCONS   50
           C     CONSTRAINT EQUATIONS WILL BE INPUT DIRECTLY FOR ALL STATIONS         INCONS   51
           C                                                                          INCONS   52
                 READ(ITAPER,100) MSTAR                                               INCONS   53
           C                                                                          INCONS   54
           C     COMPUTE NPARM NUMBER OF SEARCH VARIABLES                             INCONS   55
           C                                                                          INCONS   56
                 DO 1 I=1,NUMSTR                                                      INCONS   57
                 DO 2 J=1,13                                                          INCONS   58
```

```
      IF(SCALE(I,J).EQ.0.) GO TO 2                                     INCONS    59
      IF(J.EQ.3 .AND. KCONST.EQ.0) GO TO 2                             INCONS    60
      NPARM = NPARM + 1                                                INCONS    61
    2 CONTINUE                                                         INCONS    62
    1 CONTINUE                                                         INCONS    63
C                                                                      INCONS    64
      DO 11 I= 1,MSTAR                                                 INCONS    65
      READ(ITAPER,101) (G(J,I),J=1,NPARM)                              INCONS    66
      READ(ITAPER,101) BCOEF(I)                                        INCONS    67
   11 CONTINUE                                                         INCONS    68
      GO TO 64                                                         INCONS    69
    6 CONTINUE                                                         INCONS    70
C                                                                      INCONS    71
C     SET UP LOOP ON NUMSTR TO READ IN CONSTRAINT DATA                 INCONS    72
C     FOR SERS,MERS,AND PYLON FLEXIBILITY                              INCONS    73
C                                                                      INCONS    74
      DO 75 I = 1,NUMSTR                                               INCONS    75
      READ(ITAPER,100) ITOC                                            INCONS    76
      GO TO (20,30,40),ITOC                                            INCONS    77
C                                                                      INCONS    78
C SINGLE-STORE RACK INPUT                                              INCONS    79
C                                                                      INCONS    80
   20 CONTINUE                                                         INCONS    81
      DO 23 J= 1,4                                                     INCONS    82
      IF(SCALE(I,J).NE.0) GO TO 24                                     INCONS    83
   23 CONTINUE                                                         INCONS    84
      GO TO 40                                                         INCONS    85
   24 CONTINUE                                                         INCONS    86
      READ(ITAPER,100) NCORN                                           INCONS    87
      WRITE(ITAPEW,203) NCORN,I                                        INCONS    88
      DO 22 J= 1,NCORN                                                 INCONS    89
      READ(ITAPER,101) CORNM(J),CORNI(J)                               INCONS    90
      WRITE(ITAPEW,204) CORNM(J),CORNI(J)                              INCONS    91
   22 CONTINUE                                                         INCONS    92
      CALL SERS(NCORN,I,NPARM,CORNM,CORNI)                             INCONS    93
      NPARM = NPARM + 2                                                INCONS    94
      GO TO 40                                                         INCONS    95
C                                                                      INCONS    96
C MULTIPLE-EJECTION RACK INPUT                                         INCONS    97
C                                                                      INCONS    98
   30 CONTINUE                                                         INCONS    99
      DO 33 J= 1,7                                                     INCONS   100
      IF(SCALE(I,J).NE.0) GO TO 34                                     INCONS   101
   33 CONTINUE                                                         INCONS   102
      GO TO 40                                                         INCONS   103
   34 CONTINUE                                                         INCONS   104
      READ(ITAPER,100) NCONST                                          INCONS   105
      DO 32 J= 1,NCONST                                                INCONS   106
      READ(ITAPER,101) (CORNM(K),CORNI(K),CORNS(K),K=1,3)              INCONS   107
      CALL MERS(I,NPARM,CORNM,CORNI,CORNS)                             INCONS   108
   32 CONTINUE                                                         INCONS   109
      NPARM = NPARM + 3                                                INCONS   110
      GO TO 40                                                         INCONS   111
C                                                                      INCONS   112
   40 CONTINUE                                                         INCONS   113
C                                                                      INCONS   114
C     INPUT PYLON FLEXIBILITY CONSTRAINTS                              INCONS   115
```

```
      C                                                                 INCONS     116
            READ( ITAPER, 100) NSTAR                                    INCONS     117
            IF(NSTAR.EQ.O) GO TO 75                                     INCONS     118
      C                                                                 INCONS     119
      C     COMPUTE NEW VALUE OF NPARM                                  INCONS     120
      C                                                                 INCONS     121
            DO 60 J = 8, 13                                             INCONS     122
            J7 = J - 7                                                  INCONS     123
            IPARM(J7) = O                                               INCONS     124
            IF( SCALE(I,J) .EQ. O.O ) GO TO 60                          INCONS     125
            NPARM = NPARM + 1                                           INCONS     126
            IPARM(J7) = NPARM                                           INCONS     127
         60 CONTINUE                                                    INCONS     128
      C                                                                 INCONS     129
      C     INPUT CONSTRAINT EQUATIONS FOR PYLON FLEX                   INCONS     130
      C                                                                 INCONS     131
            DO 63 II = 1, NSTAR                                         INCONS     132
            READ(ITAPER,102)  IDOF, CLIMIT                              INCONS     133
        102 FORMAT(I5,E15.5)                                            INCONS     134
            MSTAR = MSTAR + 1                                           INCONS     135
            NAB = IABS( IDOF )                                          INCONS     136
            NPOINT = IPARM(NAB)                                         INCONS     137
            G(NPOINT,MSTAR) = 1.0 * ISIGN(1,IDOF)                       INCONS     138
            BCOEF(MSTAR) = CLIMIT * ISIGN(1,IDOF)                       INCONS     139
         63 CONTINUE                                                    INCONS     140
         75 CONTINUE                                                    INCONS     141
         64 CONTINUE                                                    INCONS     142
            WRITE(ITAPEW,200)                                           INCONS     143
            DO 51 I= 1,NPARM                                            INCONS     144
         51 WRITE(ITAPEW,202) (G(I,J),J=1,MSTAR)                        INCONS     145
            WRITE(ITAPEW,201)                                           INCONS     146
            WRITE(ITAPEW,202) (BCOEF(I),I= 1,MSTAR)                     INCONS     147
      C                                                                 INCONS     148
      CIBM                                                              INCONS     149
      C     WRITE (ITAPJP) JSET,JDIM,G,LMK,BCOEF,MSTAR,NOTJ,NOTDIM,LINDEP,     INCONS     150
      C    1                 LDDIM,NOTACT,NDIM,XO,XN,DELX,GRO,GRN,DELG,Z,HO,   INCONS     151
      C    2                 HN,HGR,NPARM,ICONV,ICN                     INCONS     152
      C     REWIND ITAPJP                                               INCONS     153
      CIBM                                                              INCONS     154
      C                                                                 INCONS     155
      CCDC                                                              INCONS     156
            CALL WRITEC(G(1,1),GECS(1,1),1750)                          INCONS     157
            CALL WRITEC(BCOEF(1),BCOECS(1),50)                          INCONS     158
            CALL WRITEC(MSTAR,MSTRECS,1)                                INCONS     159
            CALL WRITEC(NPARM,NPMECS,1)                                 INCONS     160
      CCDC                                                              INCONS     161
      C                                                                 INCONS     162
            RETURN                                                      INCONS     163
        100 FORMAT(10I5)                                                INCONS     164
        101 FORMAT(3(E15.5,5X))                                         INCONS     165
        200 FORMAT(1H1,20X,16H CONSTRAINT EQS.,///,24X,                 INCONS     166
          A        8HG MATRIX,//)                                       INCONS     167
        201 FORMAT(///,24X,8HB VECTOR,//)                               INCONS     168
        202 FORMAT(5(2X,E13.7))                                         INCONS     169
        203 FORMAT(1H1,20X,I4,22HCORNER POINTS ON RACK  ,I2,//          INCONS     170
          A        ,10X,4HMASS,10X,7HINERTIA,//)                        INCONS     171
        204 FORMAT(6X,E13.7,2X,E13.7)                                   INCONS     172
```

```
                 END                                                                INCONS     173


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

     76    I                  AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.



        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     1  INCONS         1          162

 VARIABLES     SN  TYPE             RELOCATION
  3326  BCOECS     REAL        ARRAY    INCCOM       REFS        20       27       157
 10315  BCOEF      REAL        ARRAY    JGLV         REFS        12      146       157   DEFINED       39       66      138
   552  CLIMIT     REAL                              REFS       138   DEFINED      132
   567  CORNI      REAL        ARRAY                 REFS        23       90        92       107   DEFINED       89      106
   555  CORNM      REAL        ARRAY                 REFS        23       90        92       107   DEFINED       89      106
   601  CORNS      REAL        ARRAY                 REFS        23      107   DEFINED       106
   257  DELG       REAL        ARRAY    POWELV       REFS        15
   106  DELX       REAL        ARRAY    POWELV       REFS        15
    63  G          REAL        ARRAY    JGLV         REFS        12      144       156   DEFINED       41       65      137
     0  GECS       REAL        ARRAY    INCCOM       REFS        20       27       156
   214  GRN        REAL        ARRAY    POWELV       REFS        15
   151  GRO        REAL        ARRAY    POWELV       REFS        15
  5207  HGR        REAL        ARRAY    POWELV       REFS        15
  2676  HN         REAL        ARRAY    POWELV       REFS        15
   365  HO         REAL        ARRAY    POWELV       REFS        15
   537  I          INTEGER                           REFS        39       41        58        65       66       82       87
                                                       92       100      107       124       144      146
                                                  DEFINED        38       56        64        74      143      146
  5254  ICN        INTEGER              POWELV       REFS        15
  5253  ICONV      INTEGER              POWELV       REFS        15
     0  ICYCLE     INTEGER              STRCLU       REFS        10
   551  IDOF       INTEGER                           REFS       135      137       138   DEFINED      132
    76  IDSTR      INTEGER     ARRAY    STORES       REFS         3
    40  IDYDOF     INTEGER     ARRAY    STORES       REFS         3
   542  II         INTEGER                        DEFINED        45      131
   613  IPARM      INTEGER     ARRAY                 REFS        24      136   DEFINED       123      126
     2  ISTDOF     INTEGER     ARRAY    STORES       REFS         3
     1  ISTEP      INTEGER              STRCLU       REFS        10
   535  ITAPER     INTEGER                        DEFINED        30   I/O REFS       44        52       65       66       75
                                                       86        89      104       106       116      132
     0  ITAPES     INTEGER     ARRAY    CTAPES       REFS        11       30        31
   536  ITAPEW     INTEGER                        DEFINED        31   I/O REFS       87        90      142      144      145
                                                      146
   543  ITOC       INTEGER                           REFS        76   DEFINED       75
   541  ITOC1      INTEGER                           REFS        48   DEFINED       44
   540  J          INTEGER                           REFS        41       58        59        65       82     2*89     2*90
                                                      100       122      124       144   DEFINED       40       57       65
                                                       81        88       99       105       121      144
```

```
VARIABLES      SN  TYPE            RELOCATION
    62  JDIM       INTEGER                 JGLV        REFS        12
     0  JSET       INTEGER      ARRAY      JGLV        REFS        12
   550  J7         INTEGER                             REFS       123        126   DEFINED      122
   546  K          INTEGER                             REFS     3*106    DEFINED       106
     1  KCONST     INTEGER                 STORES      REFS         3         59
 10545  LDDIM      INTEGER                 JGLV        REFS        12
 10463  LINDEP     INTEGER      ARRAY      JGLV        REFS        12
  3411  LMK        INTEGER      ARRAY      JGLV        REFS        12
 10377  MSTAR      INTEGER                 JGLV        REFS        12         64       134       137       138       144       146
                                                          158   DEFINED         46        52       134
  3411  MSTRECS    INTEGER                 INCCOM      REFS        20         27       158
     2  M1         INTEGER                 STRCLU      REFS        10
     3  M2         INTEGER                 STRCLU      REFS        10
     4  M3         INTEGER                 STRCLU      REFS        10
     5  M4         INTEGER                 STRCLU      REFS        10
   553  NAB        INTEGER                             REFS       136    DEFINED       135
   545  NCONST     INTEGER                             REFS       105    DEFINED       104
   544  NCORN      INTEGER                             REFS        87         88        92   DEFINED        86
 10630  NDIM       INTEGER                 JGLV        REFS        12
 10546  NOTACT     INTEGER      ARRAY      JGLV        REFS        12
 10462  NOTDIM     INTEGER                 JGLV        REFS        12
 10400  NOTJ       INTEGER      ARRAY      JGLV        REFS        12
  5252  NPARM      INTEGER                 POWELV      REFS        15         60        65        92        93       107       109
                                                          125        126       143       159   DEFINED        47        60        93
                                                          109        125
  3410  NPMECS     INTEGER                 INCCOM      REFS        20         27       159
   554  NPOINT     INTEGER                             REFS       137    DEFINED       136
   547  NSTAR      INTEGER                             REFS       117        131   DEFINED       116
     0  NUMSTR     INTEGER                 STORES      REFS         3         56        74
   362  SCALE      REAL         ARRAY      STORES      REFS         3         58        82       100       124
    11  STFOLD     REAL                    STRCLU      REFS        10
   653  STRFDN     REAL         ARRAY      STORES      REFS         3
   615  STRFDO     REAL         ARRAY      STORES      REFS         3
   463  STRFI      REAL         ARRAY      STORES      REFS         3
   557  STRFN      REAL         ARRAY      STORES      REFS         3
   521  STRFO      REAL         ARRAY      STORES      REFS         3
   305  STRIDN     REAL         ARRAY      STORES      REFS         3
   266  STRIDO     REAL         ARRAY      STORES      REFS         3
   122  STRII      REAL         ARRAY      STORES      REFS         3
   160  STRIN      REAL         ARRAY      STORES      REFS         3
   141  STRIO      REAL         ARRAY      STORES      REFS         3
   343  STRRDN     REAL         ARRAY      STORES      REFS         3
   324  STRRDO     REAL         ARRAY      STORES      REFS         3
   177  STRRI      REAL         ARRAY      STORES      REFS         3
   235  STRRN      REAL         ARRAY      STORES      REFS         3
   216  STRRO      REAL         ARRAY      STORES      REFS         3
   261  STRWDN     REAL         ARRAY      STORES      REFS         3
   254  STRWDO     REAL         ARRAY      STORES      REFS         3
   103  STRWI      REAL         ARRAY      STORES      REFS         3
   115  STRWN      REAL         ARRAY      STORES      REFS         3
   110  STRWO      REAL         ARRAY      STORES      REFS         3
    10  VNEW       REAL                    STRCLU      REFS        10
     7  VOLD       REAL                    STRCLU      REFS        10
     6  VS         REAL                    STRCLU      REFS        10
    43  XN         REAL         ARRAY      POWELV      REFS        15
     0  XO         REAL         ARRAY      POWELV      REFS        15
   322  Z          REAL         ARRAY      POWELV      REFS        15
```

```
VARIABLES     SN  TYPE           RELOCATION
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       MERS                  5            107
       SERS                  5             92
       WRITEC                3            156       157       158       159

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       IABS      INTEGER     1  INTRIN               135
       ISIGN     INTEGER     2  INTRIN               137       138

STATEMENT LABELS                   DEF LINE   REFERENCES
     0   1                            62         56
    46   2                            61         57       58       59
     0   5                            42         38       40
    73   6                            69         48
     0  11                            67         64
   106  20                            80         76
     0  22                            91         88
     0  23                            83         81
   115  24                            85         82
   144  30                            98         76
     0  32                           108        105
     0  33                           101         99
   153  34                           103        100
   201  40                           112         76       84       94      102      110
     0  51                           144        143
   217  60                           127        121      124
     0  63                           139        131
   245  64                           141         68
   242  75                           140         74      117
   475  100     FMT                   163         44       52       75       86      104      116
   477  101     FMT                   164         65       66       89      106
   453  102     FMT                   133        132
   502  200     FMT                   165        142
   510  201     FMT                   167        145
   513  202     FMT                   168        144      146
   516  203     FMT                   169         87
   526  204     FMT                   171         90

LOOPS   LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
     6   5         I          38  42       14B               NOT INNER
    15   5         J          40  42        2B      INSTACK
    32   1         I          56  62       21B               NOT INNER
    41   2         J          57  61        7B      INSTACK
    54   11        I          64  67       17B               EXT REFS
    74   75        I          74 140      151B               EXT REFS  NOT INNER
   107   23        J          81  83        5B      INSTACK    EXITS
   122   22        J          88  91       17B               EXT REFS
   145   33        J          99 101        5B      INSTACK    EXITS
   156   32        J         105 108       22B               EXT REFS  NOT INNER
   161             K         106 106       11B               EXT REFS
   212   60        J         121 127        7B      INSTACK
   223   63        II        131 139       17B               EXT REFS
   250   51        I         143 144       20B               EXT REFS  NOT INNER
   253             J         144 144       11B               EXT REFS
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       STORES      457                0 NUMSTR (1)             1 KCONST (1)             2 ISTDOF (30)
                                     32 IDYDOF (30)           62 IDSTR  (5)            67 STRWI  (5)
                                     72 STRWO  (5)            77 STRWN  (5)            82 STRII  (15)
                                     97 STRIO  (15)          112 STRIN  (15)          127 STRRI  (15)
                                    142 STRRO  (15)          157 STRRN  (15)          172 STRWDO (5)
                                    177 STRWDN (5)           182 STRIDO (15)          197 STRIDN (15)
                                    212 STRRDO (15)          227 STRRDN (15)          242 SCALE  (65)
                                    307 STRFI  (30)          337 STRFO  (30)          367 STRFN  (30)
                                    397 STRFDO (30)          427 STRFDN (30)
       STRCLU       10                0 ICYCLE (1)             1 ISTEP  (1)             2 M1     (1)
                                      3 M2     (1)             4 M3     (1)             5 M4     (1)
                                      6 VS     (1)             7 VOLD   (1)             8 VNEW   (1)
                                      9 STPOLD (1)
       CTAPES       50                0 ITAPES (50)
       JGLV       4505                0 JSET   (50)           50 JDIM   (1)            51 G      (1750)
                                   1801 LMK    (2500)       4301 BCOEF  (50)         4351 MSTAR  (1)
                                   4352 NOTJ   (50)         4402 NOTDIM (1)          4403 LINDEP (50)
                                   4453 LDDIM  (1)          4454 NOTACT (50)         4504 NDIM   (1)
       POWELV     2733                0 XO     (35)           35 XN     (35)           70 DELX   (35)
                                    105 GRO    (35)          140 GRN    (35)          175 DELG   (35)
                                    210 Z      (35)          245 HO     (1225)       1470 HN     (1225)
                                   2695 HGR    (35)         2730 NPARM  (1)          2731 ICONV  (1)
                                   2732 ICN    (1)
       INCCOM     1802 ECS            0 GECS   (1750)       1750 BCOECS (50)         1800 NPMECS (1)
                                   1801 MSTRECS(1)

STATISTICS
  PROGRAM LENGTH                 621B      401
  CM LABELED COMMON LENGTH     17113B     7755
  ECS LABELED COMMON LENGTH     3412B     1802
          52000B CM USED
```

```
      SUBROUTINE SERS(NCP,IS,II,CORNM,CORNI)                            SERS   2
      COMMON /JGLV/ USET(' )),JDIM,G(35,50),LMK(50,50),BCOEF(50),       SERS   3
     1              MSTAR,\OTJ(50),NOTDIM,LINDEP(50),LDDIM,             SERS   4
     2              NOTACT(50),NDIM                                     SERS   5
      COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    SERS   6
     A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)           SERS   7
     B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                SERS   8
     C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                SERS   9
     D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                        SERS  10
     E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                           SERS  11
     F      ,STRFDO(5,6),STRFDN(5,6)                                    SERS  12
       DIMENSION CORNM(1),CORNI(1),X(10),Y(10)                          SERS  13
C                                                                       SERS  14
C SCALE CORNER POINTS                                                   SERS  15
C                                                                       SERS  16
      DO 1 I= 1,NCP                                                     SERS  17
      X(I)  = CORNM(I)/SCALE(IS,1)                                      SERS  18
      Y(I)  = CORNI(I)/SCALE(IS,3)                                      SERS  19
    1 CONTINUE                                                          SERS  20
      DO 2 I= 1,NCP                                                     SERS  21
      IF(I.LT.NCP) GO TO 3                                              SERS  22
      DX    = X(1) - X(I)                                               SERS  23
      DY    = Y(1) - Y(I)                                               SERS  24
      GO TO 4                                                           SERS  25
    3 CONTINUE                                                          SERS  26
      DX    = X(I+1) - X(I)                                             SERS  27
      DY    = Y(I+1) - Y(I)                                             SERS  28
    4 CONTINUE                                                          SERS  29
      R     = SQRT(DX*DX + DY*DY)                                       SERS  30
C                                                                       SERS  31
C COMPUTE UNIT NORMAL                                                   SERS  32
C                                                                       SERS  33
      DNX   = -DY/R                                                     SERS  34
      DNY   = DX/R                                                      SERS  35
C                                                                       SERS  36
C COMPUTE OFFSET                                                        SERS  37
C                                                                       SERS  38
      OB    = DNX*X(I) + DNY*Y(I)                                       SERS  39
C                                                                       SERS  40
C FILL-UP B & G ARRAYS                                                  SERS  41
C                                                                       SERS  42
      MSTAR = MSTAR + 1                                                 SERS  43
      I1    = II+1                                                      SERS  44
      I2    = II+2                                                      SERS  45
      BCOEF(MSTAR)= OB                                                  SERS  46
      DO 5 J=1,35                                                       SERS  47
    5 G(J,MSTAR)= 0.                                                    SERS  48
      G(I1,MSTAR) = DNX                                                 SERS  49
      G(I2,MSTAR) = DNY                                                 SERS  50
    2 CONTINUE                                                          SERS  51
      RETURN                                                            SERS  52
      END                                                               SERS  53
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  SERS            1          51

VARIABLES      SN  TYPE          RELOCATION
10315  BCOEF       REAL       ARRAY    JGLV          REFS        2    DEFINED      45
    0  CORNI       REAL       ARRAY     F.P.         REFS       12         18    DEFINED        1
    0  CORNM       REAL       ARRAY     F.P.         REFS       12         17    DEFINED        1
  106  DNX         REAL                              REFS       38         48    DEFINED       33
  107  DNY         REAL                              REFS       38         49    DEFINED       34
  103  DX          REAL                              REFS     2*29         34    DEFINED       22        26
  104  DY          REAL                              REFS     2*29         33    DEFINED       23        27
   63  G           REAL       ARRAY    JGLV          REFS        2    DEFINED        47          48        49
  102  I           INTEGER                           REFS     2*17       2*18        21          22        23      2*26      2*27
                                                   2*38    DEFINED         16        20
   76  IDSTR       INTEGER    ARRAY    STORES        REFS        5
   40  IDYDOF      INTEGER    ARRAY    STORES        REFS        5
    0  II          INTEGER              F.P.         REFS       43         44    DEFINED        1
    0  IS          INTEGER              F.P.         REFS       17         18    DEFINED        1
    2  ISTDOF      INTEGER    ARRAY    STORES        REFS        5
  111  I1          INTEGER                           REFS       48    DEFINED        43
  112  I2          INTEGER                           REFS       49    DEFINED        44
  113  J           INTEGER                           REFS       47    DEFINED        46
   62  JDIM        INTEGER             JGLV          REFS        2
    0  JSET        INTEGER    ARRAY    JGLV          REFS        2
    1  KCONST      INTEGER             STORES        REFS        5
10545  LDDIM       INTEGER             JGLV          REFS        2
10463  LINDEP      INTEGER    ARRAY    JGLV          REFS        2
 3411  LMK         INTEGER    ARRAY    JGLV          REFS        2
10377  MSTAR       INTEGER             JGLV          REFS        2         42        45          47        48        49
                                                 DEFINED      42
    0  NCP         INTEGER              F.P.         REFS       16         20        21     DEFINED         1
10630  NDIM        INTEGER             JGLV          REFS        2
10546  NOTACT      INTEGER    ARRAY    JGLV          REFS        2
10462  NOTDIM      INTEGER             JGLV          REFS        2
10400  NOTJ        INTEGER    ARRAY    JGLV          REFS        2
    0  NUMSTR      INTEGER             STORES        REFS        5
  110  OB          REAL                              REFS       45    DEFINED        38
  105  R           REAL                              REFS       33         34    DEFINED       29
  362  SCALE       REAL       ARRAY    STORES        REFS        5         17        18
  653  STRFDN      REAL       ARRAY    STORES        REFS        5
  615  STRFDO      REAL       ARRAY    STORES        REFS        5
  463  STRFI       REAL       ARRAY    STORES        REFS        5
  557  STRFN       REAL       ARRAY    STORES        REFS        5
  521  STRFO       REAL       ARRAY    STORES        REFS        5
  305  STRIDN      REAL       ARRAY    STORES        REFS        5
  266  STRIDO      REAL       ARRAY    STORES        REFS        5
  122  STRII       REAL       ARRAY    STORES        REFS        5
  160  STRIN       REAL       ARRAY    STORES        REFS        5
  141  STRIO       REAL       ARRAY    STORES        REFS        5
  343  STRRDN      REAL       ARRAY    STORES        REFS        5
  324  STRRDO      REAL       ARRAY    STORES        REFS        5
  177  STRRI       REAL       ARRAY    STORES        REFS        5
  235  STRRN       REAL       ARRAY    STORES        REFS        5
  216  STRRO       REAL       ARRAY    STORES        REFS        5
```

```
VARIABLES     SN  TYPE           RELOCATION
  261  STRWDN    REAL       ARRAY    STORES       REFS        5
  254  STRWDO    REAL       ARRAY    STORES       REFS        5
  103  STRWI     REAL       ARRAY    STORES       REFS        5
  115  STRWN     REAL       ARRAY    STORES       REFS        5
  110  STRWO     REAL       ARRAY    STORES       REFS        5
  114  X         REAL       ARRAY                 REFS       12       2*22      2*26      38   DEFINED      17
  126  Y         REAL       ARRAY                 REFS       12       2*23      2*27      38   DEFINED      18

EXTERNALS           TYPE   ARGS       REFERENCES
       SQRT      REAL      1 LIBRARY     29

STATEMENT LABELS              DEF LINE   REFERENCES
    0  1                         19         16
    0  2                         50         20
   34  3                         25         21
   41  4                         28         24
    0  5                         47         46

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   16  1        I          16 19        5B       INSTACK
   25  2        I          20 50       53B                 EXT REFS  NOT INNER
   65  5        J          46 47        2B       INSTACK

COMMON BLOCKS  LENGTH      MEMBERS - BIAS NAME(LENGTH)
       JGLV      4505                0 JSET    (50)             50 JDIM    (1)             51 G      (1750)
                                  1801 LMK     (2500)         4301 BCOEF   (50)          4351 MSTAR  (1)
                                  4352 NOTJ    (50)           4402 NOTDIM  (1)           4403 LINDEP (50)
                                  4453 LDDIM   (1)            4454 NOTACT  (50)          4504 NDIM   (1)
       STORES     457                0 NUMSTR  (1)               1 KCONST  (1)              2 ISTDOF (30)
                                    32 IDYDOF  (30)             62 IDSTR   (5)             67 STRWI  (5)
                                    72 STRWO   (5)              77 STRWN   (5)             82 STRII  (15)
                                    97 STRIO   (15)            112 STRIN   (15)           127 STRRI  (15)
                                   142 STRRO   (15)            157 STRRN   (15)           172 STRWDO (5)
                                   177 STRWDN  (5)             182 STRIDO  (15)           197 STRIDN (15)
                                   212 STRRDO  (15)            227 STRRDN  (15)           242 SCALE  (65)
                                   307 STRFI   (30)            337 STRFO   (30)           367 STRFN  (30)
                                   397 STRFDO  (30)            427 STRFDN  (30)

STATISTICS
  PROGRAM LENGTH                 144B     100
  CM LABELED COMMON LENGTH     11542B    4962
          52000B CM USED
```

```
      SUBROUTINE MERS(IS,II,CORNM,CORNI,CORNS)
      COMMON /JGLV/ JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50),
     1              MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,
     2              NOTACT(50),NDIM
      COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)
     A     ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)
     B     ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)
     C     ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)
     D     ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)
     E     ,STRFI(5,6),STRFO(5,6),STRFN(5,6)
     F     ,STRFDO(5,6),STRFDN(5,6)
      DIMENSION CORNM(1),CORNI(1),CORNS(1),X(3),Y(3),Z(3)
      DIMENSION P21(3),P23(3)
C
C SCALE #OINTS ON PLANE
C
      DO 1 I= 1,3
      X(I)   = CORNM(I)/SCALE(IS,1)
      Y(I)   = CORNI(I)/SCALE(IS,3)
      Z(I)   = CORNS(I)/SCALE(IS,5)
    1 CONTINUE
C
C COMPUTE 2 VECTORS IN THE PLANE
C
      P21(1) = X(1) - X(2)
      P21(2) = Y(1) - Y(2)
      P21(3) = Z(1) - Z(2)
      P23(1) = X(3) - X(2)
      P23(2) = Y(3) - Y(2)
      P23(3) = Z(3) - Z(2)
C
C COMPUTE NORMAL VECTOR
C
      DX     = P21(2)*P23(3) - P21(3)*P23(2)
      DY     = P21(3)*P23(1) - P21(1)*P23(3)
      DZ     = P21(1)*P23(2) - P21(2)*P23(1)
      R      = SQRT(DX*DX + DY*DY +DZ*DZ)
C
C COMPUTE UNIT NORMAL
C
      DX     = DX/R
      DY     = DY/R
      DZ     = DZ/R
C
C COMPUTE OFFSET
C
      OB     = DX*X(2) + DY*Y(2) + DZ*Z(2)
C
C FILL-UP B & G ARRAYS
C
      MSTAR = MSTAR + 1
      I1     = II+1
      I2     = II+2
      I3     = II+3
      BCOEF(MSTAR) = OB
      DO 2 I=1,35
    2 G(I,MSTAR) = 0.0
```

```
                  G(I1,MSTAR) = DX                                                   MERS       59
                  G(I2,MSTAR) = DY                                                   MERS       60
   60             G(I3,MSTAR) = DZ                                                   MERS       61
                  RETURN                                                             MERS       62
                  END                                                                MERS       63
```

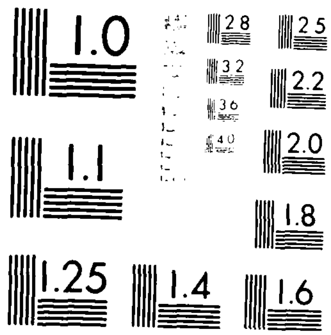
SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  MERS           1          61

VARIABLES      SN  TYPE            RELOCATION
10315  BCOEF       REAL        ARRAY    JGLV       REFS          2   DEFINED      55
    0  CORNI       REAL        ARRAY     F.P.      REFS         12        19   DEFINED       1
    0  CORNM       REAL        ARRAY     F.P.      REFS         12        18   DEFINED       1
    0  CORNS       REAL        ARRAY     F.P.      REFS         12        20   DEFINED       1
  115  DX          REAL                            REFS       2*37        41        47      58   DEFINED      34      41
  116  DY          REAL                            REFS       2*37        42        47      59   DEFINED      35      42
  117  DZ          REAL                            REFS       2*37        43        47      60   DEFINED      36      43
   63  G           REAL        ARRAY    JGLV       REFS          2   DEFINED        57      58        59      60
  114  I           INTEGER                         REFS       2*18      2*19      2*20      57   DEFINED      17      56
   76  IDSTR       INTEGER     ARRAY    STORES     REFS          5
   40  IDYDOF      INTEGER     ARRAY    STORES     REFS          5
    0  II          INTEGER               F.P.      REFS         52        53        54 DEFINED         1
    0  IS          INTEGER               F.P.      REFS         18        19        20 DEFINED         1
    2  ISTDOF      INTEGER     ARRAY    STORES     REFS          5
  122  I1          INTEGER                         REFS         58   DEFINED      52
  123  I2          INTEGER                         REFS         59   DEFINED      53
  124  I3          INTEGER                         REFS         60   DEFINED      54
   62  JDIM        INTEGER              JGLV       REFS          2
    0  JSET        INTEGER     ARRAY    JGLV       REFS          2
    1  KCONST      INTEGER              STORES     REFS          5
10545  LDDIM       INTEGER              JGLV       REFS          2
10463  LINDEP      INTEGER     ARRAY    JGLV       REFS          2
 3411  LMK         INTEGER     ARRAY    JGLV       REFS          2
10377  MSTAR       INTEGER              JGLV       REFS          2        51        55      57        58      59      60
                                                DEFINED         51
10630  NDIM        INTEGER              JGLV       REFS          2
10546  NOTACT      INTEGER     ARRAY    JGLV       REFS          2
10462  NOTDIM      INTEGER              JGLV       REFS          2
10400  NOTJ        INTEGER     ARRAY    JGLV       REFS          2
    0  NUMSTR      INTEGER              STORES     REFS          5
  121  OB          REAL                            REFS         55   DEFINED      47
  136  P21         REAL        ARRAY               REFS         13      2*34      2*35    2*36   DEFINED      25      26
                                                     27
  141  P23         REAL        ARRAY               REFS         13      2*34      2*35    2*36   DEFINED      28      29
                                                     30
  120  R           REAL                            REFS         41        42        43 DEFINED        37
  362  SCALE       REAL        ARRAY    STORES     REFS          5        18        19      20
  653  STRFDN      REAL        ARRAY    STORES     REFS          5
  615  STRFDO      REAL        ARRAY    STORES     REFS          5
  463  STRFI       REAL        ARRAY    STORES     REFS          5
  557  STRFN       REAL        ARRAY    STORES     REFS          5
```

AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2 7/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART

```
VARIABLES      SN  TYPE          RELOCATION
  521  STRFO       REAL      ARRAY    STORES       REFS        5
  305  STRIDN      REAL      ARRAY    STORES       REFS        5
  266  STRIDO      REAL      ARRAY    STORES       REFS        5
  122  STRII       REAL      ARRAY    STORES       REFS        5
  160  STRIN       REAL      ARRAY    STORES       REFS        5
  141  STRIO       REAL      ARRAY    STORES       REFS        5
  343  STRRDN      REAL      ARRAY    STORES       REFS        5
  324  STRRDO      REAL      ARRAY    STORES       REFS        5
  177  STRRI       REAL      ARRAY    STORES       REFS        5
  235  STRRN       REAL      ARRAY    STORES       REFS        5
  216  STRRO       REAL      ARRAY    STORES       REFS        5
  261  STRWDN      REAL      ARRAY    STORES       REFS        5
  254  STRWDO      REAL      ARRAY    STORES       REFS        5
  103  STRWI       REAL      ARRAY    STORES       REFS        5
  115  STRWN       REAL      ARRAY    STORES       REFS        5
  110  STRWO       REAL      ARRAY    STORES       REFS        5
  125  X           REAL      ARRAY                 REFS       12      2*25     2*28     47   DEFINED      18
  130  Y           REAL      ARRAY                 REFS       12      2*26     2*29     47   DEFINED      19
  133  Z           REAL      ARRAY                 REFS       12      2*27     2*30     47   DEFINED      20

EXTERNALS           TYPE    ARGS        REFERENCES
       SQRT         REAL     1 LIBRARY     37

STATEMENT LABELS             DEF LINE   REFERENCES
    0  1                        21          17
    0  2                        57          56

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   17  1         I           17 21         6B       INSTACK
   76  2         I           56 57         2B       INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGLV       4505                0 JSET    (50)              50 JDIM   (1)                 51 G      (1750)
                                   1801 LMK     (2500)          4301 BCOEF  (50)              4351 MSTAR  (1)
                                   4352 NOTJ    (50)            4402 NOTDIM (1)               4403 LINDEP (50)
                                   4453 LDDIM   (1)             4454 NOTACT (50)              4504 NDIM   (1)
       STORES      457                0 NUMSTR  (1)                1 KCONST (1)                  2 ISTDOF (30)
                                     32 IDYDOF  (30)              62 IDSTR  (5)                 67 STRWI  (5)
                                     72 STRWO   (5)               77 STRWN  (5)                 82 STRII  (15)
                                     97 STRIO   (15)             112 STRIN  (15)               127 STRRI  (15)
                                    142 STRRO   (15)             157 STRRN  (15)               172 STRWDO (5)
                                    177 STRWDN  (5)              182 STRIDO (15)               197 STRIDN (15)
                                    212 STRRDO  (15)             227 STRRDN (15)               242 SCALE  (65)
                                    307 STRFI   (30)             337 STRFO  (30)               367 STRFN, (30)
                                    397 STRFDO  (30)             427 STRFDN (30)

STATISTICS
  PROGRAM LENGTH                  144B      100
  CM LABELED COMMON LENGTH      11542B     4962
         52000B CM USED
```

```
      SUBROUTINE RECONS(II)                                             RECONS   2
      COMMON /CTAPES/ ITAPES(50)                                        RECONS   3
      COMMON /JGL   / JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)       RECONS   4
     1             ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM RECONS   5
      COMMON /NEWCON/  JNEW(50),NEWDIM                                  RECONS   6
C                                                                       RECONS   7
      ITAPER= ITAPES(5)                                                 RECONS   8
      ITAPEW= ITAPES(6)                                                 RECONS   9
      ITAPEP= ITAPES(48)                                                RECONS  10
C                                                                       RECONS  11
CCDC                                                                    RECONS  12
      ITAPEI = ITAPES(47)                                               RECONS  13
CCDC                                                                    RECONS  14
C                                                                       RECONS  15
      IF(II.EQ.0) GO TO 5                                               RECONS  16
C                                                                       RECONS  17
C FOR RESTART, READ IN OLD CONSTRAINT INFO.                             RECONS  18
C                                                                       RECONS  19
CIBM                                                                    RECONS  20
C     READ(ITAPER,10) JDIM,NOTDIM                                       RECONS  21
CIBM                                                                    RECONS  22
C                                                                       RECONS  23
CCDC                                                                    RECONS  24
      READ (ITAPEI,10) JDIM,NOTDIM                                      RECONS  25
CCDC                                                                    RECONS  26
C                                                                       RECONS  27
      IF(JDIM.EQ.0) GO TO 1                                             RECONS  28
      WRITE(ITAPEW,12) JDIM                                             RECONS  29
C                                                                       RECONS  30
CIBM                                                                    RECONS  31
C     READ (ITAPER,10) (JSET(I),I=1,MSTAR)                              RECONS  32
CIBM                                                                    RECONS  33
C                                                                       RECONS  34
CCDC                                                                    RECONS  35
      READ (ITAPEI,10) (JSET(I),I=1,MSTAR)                              RECONS  36
CCDC                                                                    RECONS  37
C                                                                       RECONS  38
      WRITE(ITAPEW,10) (JSET(I),I=1,MSTAR)                              RECONS  39
    1 CONTINUE                                                          RECONS  40
      IF(NOTDIM.FQ.0) GO TO 2                                           RECONS  41
      WRITE(ITAPEW,13) NOTDIM                                           RECONS  42
C                                                                       RECONS  43
CIBM                                                                    RECONS  44
C     READ (ITAPER,10) (NOTJ(I),I=1,MSTAR)                              RECONS  45
CIBM                                                                    RECONS  46
C                                                                       RECONS  47
CCDC                                                                    RECONS  48
      READ (ITAPEI,10) (NOTJ(I),I=1,MSTAR)                              RECONS  49
CCDC                                                                    RECONS  50
C                                                                       RECONS  51
      WRITE(ITAPEW,10) (NOTJ(I),I=1,MSTAR)                              RECONS  52
    2 CONTINUE                                                          RECONS  53
      IF(JDIM.EQ.0) GO TO 4                                             RECONS  54
      WRITE(ITAPEW,15)                                                  RECONS  55
      DO 3 I= 1,JDIM                                                    RECONS  56
C                                                                       RECONS  57
CIBM                                                                    RECONS  58
```

```
C     READ (ITAPER,14) (LMK(I,J),J=1,JDIM)
CIBM
C
CCDC
      READ (ITAPEI,14) (LMK(I,J),J=1,JDIM)
CCDC
C
      WRITE(ITAPEW,14) (LMK(I,J),J=1,JDIM)
    3 CONTINUE
    4 CONTINUE
C
CIBM
C     READ(ITAPER,10)  NEWDIM,(JNEW(I), I=1,NEWDIM)
CIBM
C
CCDC
      READ (ITAPEI,10) NEWDIM,(JNEW(I),I=1,NEWDIM)
CCDC
C
      IF(NEWDIM.NE.O) WRITE(ITAPEW,16) NEWDIM,(JNEW(I), I=1,NEWDIM)
      RETURN
C
C SAVE CONSTRAINT INFO. FOR RESTART
C
    5 CONTINUE
      WRITE(ITAPEP,10) JDIM,NOTDIM
      IF(JDIM.EQ.O) GO TO 6
      WRITE(ITAPEW,12) JDIM
      WRITE(ITAPEW,10) (JSET(I),I=1,MSTAR)
      WRITE(ITAPEP,10) (JSET(I),I=1,MSTAR)
    6 CONTINUE
      IF(NOTDIM.EQ.O) GO TO 7
      WRITE(ITAPEW,13) NOTDIM
      WRITE(ITAPEW,10) (NOTJ(I),I=1,MSTAR)
      WRITE(ITAPEP,10) (NOTJ(I),I=1,MSTAR)
    7 CONTINUE
      IF(JDIM.EQ.O) GO TO 9
      WRITE(ITAPEW,15)
      DO 8 I= 1,JDIM
      WRITE(ITAPEW,14) (LMK(I,J),J=1,JDIM)
      WRITE(ITAPEP,14) (LMK(I,J),J=1,JDIM)
    8 CONTINUE
    9 CONTINUE
      WRITE(ITAPEP,10) NEWDIM,(JNEW(I), I=1,NEWDIM)
      RETURN
   10 FORMAT(10I5)
   12 FORMAT(//2X,27HAS RESTART BEGINS THERE ARE,
     1       I3,46H ACTIVE CONSTRAINTS WITH THE FOLLOWING INDICES/)
   13 FORMAT(//2X,27HAS RESTART BEGINS THERE ARE,
     1       I3,48H INACTIVE CONSTRAINTS WITH THE FOLLOWING INDICES/)
   14 FORMAT(5(2X,E13.7))
   15 FORMAT (//2X,28HTHE INVERSE MOMENT MATRIX IS/)
   16 FORMAT(1HO,2X,I2,29H NEW CONSTRAINTS WITH INDICES,10I3)
      END
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  RECONS          1          78       102

VARIABLES     SN  TYPE             RELOCATION
10315  BCOEF      REAL       ARRAY    JGL         REFS      3
   63  G          REAL       ARRAY    JGL         REFS      3
  457  I          INTEGER                         REFS     35       38       48       51       62       65       74
                                                    77     86       87       91       92       97       98      101
                                                DEFINED    35       38       48       51       55       74       77
                                                    86     87       91       92       96      101
    0  II         INTEGER             F.P.        REFS     15    DEFINED      1
  456  ITAPEI     INTEGER                       DEFINED    12    I/O REFS    24       35       48       62       74
  455  ITAPEP     INTEGER                       DEFINED     9    I/O REFS    83       87       92       98      101
  453  ITAPER   * INTEGER                       DEFINED     7
    0  ITAPES     INTEGER    ARRAY    CTAPES      REFS      2        7        8        9       12
  454  ITAPEW     INTEGER                       DEFINED     8    I/O REFS    28       38       41       51       54
                                                    65     77       85       86       90       91       95       97
  460  J          INTEGER                         REFS     62       65       97       98    DEFINED     62       65
                                                    97     98
   62  JDIM       INTEGER             JGL         REFS      3       27       28       53       55       62       65
                                                    83     84       85       94       96       97       98
                                                DEFINED    24
    0  JNEW       INTEGER    ARRAY    NEWCON      REFS      5       77      101    DEFINED      74
    0  JSET       INTEGER    ARRAY    JGL         REFS      3       38       86       87    DEFINED     35
10545  LDDIM      INTEGER             JGL         REFS      3
10463  LINDEP     INTEGER    ARRAY    JGL         REFS      3
 3411  LMK        INTEGER    ARRAY    JGL         REFS      3       65       97       98    DEFINED     62
10377  MSTAR      INTEGER             JGL         REFS      3       35       38       48       51       86       87
                                                    91     92
10630  NDIM       INTEGER             JGL         REFS      3
   62  NEWDIM     INTEGER             NEWCON      REFS      5       74     3*77    2*101    DEFINED     74
10546  NOTACT     INTEGER    ARRAY    JGL         REFS      3
10462  NOTDIM     INTEGER             JGL         REFS      3       40       41       83       89       90
                                                DEFINED    24
10400  NOTJ       INTEGER    ARRAY    JGL         REFS      3       51       91       92    DEFINED     48
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS            DEF LINE   REFERENCES
   32  1                       39        27
   47  2                       52        40
    0  3                       66        55
  110  4                       67        53
  126  5                       82        15
  145  6                       88        84
  162  7                       93        89
    0  8                       99        96
  223  9                      100        94
  406  10      FMT            103        24       35       38       48       51       74       83       86       87
                                         91       92      101
  410  12      FMT            104        28       85
  422  13      FMT            106        41       90
  435  14      FMT            108        62       65       97       98
  440  15      FMT            109        54       95
  445  16      FMT            110        77
```

```
LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   53  3         I            55 66        35B               EXT REFS  NOT INNER
   56            J            62 62        11B               EXT REFS
   73            J            65 65        11B               EXT REFS
  166  8         I            96 99        35B               EXT REFS  NOT INNER
  171            J            97 97        11B               EXT REFS
  206            J            98 98        11B               EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES        50                0 ITAPES (50)
       JGL         4505                0 JSET   (50)                 50 JDIM   (1)                51 G      (1750)
                                    1801 LMK    (2500)             4301 BCOEF  (50)             4351 MSTAR  (1)
                                    4352 NOTJ   (50)               4402 NOTDIM (1)              4403 LINDEP (50)
                                    4453 LDDIM  (1)                4454 NOTACT (50)             4504 NDIM   (1)
       NEWCON        51                0 JNEW   (50)                 50 NEWDIM (1)

STATISTICS
  PROGRAM LENGTH                461B     305
  CM LABELED COMMON LENGTH    10776B    4606
        52000B CM USED
```

```
          SUBROUTINE SETJGL                                             SETJGL     2
          COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50) SETJGL     3
         1         ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM SETJGL  4
          COMMON /CTAPES/ ITAPES                                        SETJGL     5
          COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35) SETJGL 6
         1                 ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON SETJGL    7
          COMMON /MAX/      MAXDIM                                      SETJGL     8
C                                                                       SETJGL     9
C                                                                       SETJGL    10
          DIMENSION CFCN(50),G1SK(35),ITAPES(50)                        SETJGL    11
CIBM                                                                    SETJGL    12
C         REAL*8 SUM                                                    SETJGL    13
CIBM                                                                    SETJGL    14
          REAL LMK                                                      SETJGL    15
C                                                                       SETJGL    16
          ITAPEW = ITAPES(6)                                            SETJGL    17
          WRITE(ITAPEW,1)                                               SETJGL    18
C                                                                       SETJGL    19
C         CALCULATE VALUES OF CONSTRAINT FUNCTIONS AT XN                SETJGL    20
C                                                                       SETJGL    21
          DO 100 J=1,MSTAR                                              SETJGL    22
CCDC                                                                    SETJGL    23
          SUM = 0.0                                                     SETJGL    24
CCDC                                                                    SETJGL    25
CIBM                                                                    SETJGL    26
C         SUM = 0.D0                                                    SETJGL    27
CIBM                                                                    SETJGL    28
          JS = (J-1) * MAXDIM + 1                                       SETJGL    29
          CFCN(J) = SOSCAP(G,XN,SUM,NPARM,1,1,JS,1) - BCOEF(J)          SETJGL    30
      100 CONTINUE                                                      SETJGL    31
          WRITE(ITAPEW,6)                                               SETJGL    32
          WRITE(ITAPEW,5) (CFCN(J), J=1,MSTAR)                          SETJGL    33
C                                                                       SETJGL    34
C         TEST TO SEE WHICH CONSTRAINTS ARE ACTIVE AND SET UP POINTER VECTOR SETJGL 35
C                                                                       SETJGL    36
          NOTDIM = 0                                                    SETJGL    37
          JDIM = 0                                                      SETJGL    38
          LDDIM = 0                                                     SETJGL    39
          IND2 = 0                                                      SETJGL    40
          INDEX = 0                                                     SETJGL    41
          IND=0                                                         SETJGL    42
          DO 50 J=1,MSTAR                                               SETJGL    43
          JSET(J) = 0                                                   SETJGL    44
          NOTJ(J) = 0                                                   SETJGL    45
          LINDEP(J) = 0                                                 SETJGL    46
          NOTACT(J) = 0                                                 SETJGL    47
          IF(CFCN(J).LT.-1.0E-03) GO TO 40                              SETJGL    48
          IF(INDEX.GT.0) GO TO 20                                       SETJGL    49
C                                                                       SETJGL    50
C         INITIALIZE LMK AND JDIM                                       SETJGL    51
C                                                                       SETJGL    52
          INDEX = INDEX + 1                                             SETJGL    53
          JSET(1) = J                                                   SETJGL    54
          JDIM = 1                                                      SETJGL    55
          DO 10 I=1,NPARM                                               SETJGL    56
CCDC                                                                    SETJGL    57
          SUM = 0.0                                                     SETJGL    58
```

```
CCDC
CIBM
C     SUM = 0.D0
CIBM
      KS = (J-1) * MAXDIM + 1
      IS = (I-1) * MAXDIM + 1
      G1SK(I) = SOSCAP(G,HN,SUM,NPARM,1,1,KS,IS)
   10 CONTINUE
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      VAR = SOSCAP(G1SK,G,SUM,NPARM,1,1,1,KS)
      LMK(1,1) = 1.0/VAR
      GO TO 50
   20 CONTINUE
      JDUM = J
      LD = 0
      KALL = 0
      CALL ADDCON(JDUM,KALL,LD)
      IF(LD.NE.1) GO TO 50
      IND2 = IND2 + 1
      LINDEP(IND2) = J
   40 CONTINUE
      IND = IND + 1
      NOTJ(IND) = J
   50 CONTINUE
      NOTDIM = IND
      LDDIM = IND2
      IND = 0
      DO 70 I=1,NOTDIM
      ICON = NOTJ(I)
      ITEST = 0
      DO 60 K=1,LDDIM
   60 IF(LINDEP(K).EQ.ICON) ITEST = 1
      IF(ITEST.EQ.1) GO TO 70
      IND = IND + 1
      NOTACT(IND) = NOTJ(I)
   70 CONTINUE
      NDIM = IND
      IF(JDIM.EQ.0) RETURN
C
      WRITE(ITAPEW,2) (JSET(J),J=1,JDIM)
      WRITE(ITAPEW,4)
      DO 80 I=1,JDIM
      WRITE(ITAPEW,3) (LMK(I,J),J=1,JDIM)
   80 CONTINUE
    1 FORMAT(1H0,/,10X,15HENTERING SETJGL)
    2 FORMAT(1H0,10X,7HJSET = ,10I5)
    3 FORMAT(10X,10(1X,1P1E11.4))
    4 FORMAT(//10X,27HINVERSE MOMENT MATRIX,  LMK/)
    5 FORMAT(5(2X,1PE12.5))
    6 FORMAT(//10X,26HCONSTRAINT FUNCTIONS AT XN/)
      RETURN
      END
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    1  SETJGL          1          100       113

VARIABLES      SN  TYPE              RELOCATION
10315  BCOEF       REAL        ARRAY     JGL          REFS        2        29
  327  CFCN        REAL        ARRAY                  REFS       10        32        47   DEFINED        29
  257  DELG        REAL        ARRAY     POWELL       REFS        5
  106  DELX        REAL        ARRAY     POWELL       REFS        5
   63  G           REAL        ARRAY     JGL          REFS        2        29        64        72
  214  GRN         REAL        ARRAY     POWELL       REFS        5
  151  GRO         REAL        ARRAY     POWELL       REFS        5
  411  G1SK        REAL        ARRAY                  REFS       10        72   DEFINED        64
 5207  HGR         REAL        ARRAY     POWELL       REFS        5
 2676  HN          REAL        ARRAY     POWELL       REFS        5        64
  365  HO          REAL        ARRAY     POWELL       REFS        5
  316  I           INTEGER                            REFS       63        64        91        97       105
                                                   DEFINED       55        90       104
 5253  ICON        INTEGER               POWELL       REFS        5        94   DEFINED        91
  315  IND         INTEGER                            REFS       84        85        87        96        97        99
                                                   DEFINED       41        84        89        96
  314  INDEX       INTEGER                            REFS       48        52   DEFIN"D        40        52
  313  IND2        INTEGER                            REFS       81        82        88   DEFINED        39        81
  320  IS          INTEGER                            REFS       64   DEFINED        63
    0  ITAPES      INTEGER     ARRAY     CTAPES       REFS        4        10        16
  307  ITAPEW      INTEGER                         DEFINED       16  I/O REFS        17        31        32       102       103
                                                       105
  325  ITEST       INTEGER                            REFS       95   DEFINED        92        94
  310  J           INTEGER                            REFS       28      2*29        32        43        44        45        46
                                                        47       53        62        76        82        85       102       105
                                                   DEFINED       21        32        42       102       105
   62  JDIM        INTEGER               JGL          REFS        2       100       102       104       105
                                                   DEFINED       37        54
  322  JDUM        INTEGER                            REFS       79   DEFINED        76
  312  JS          INTEGER                            REFS       29   DEFINED        28
    0  JSET        INTEGER     ARRAY     JGL          REFS        2       102   DEFINED        43        53
  326  K           INTEGER                            REFS       94   DEFINED        93
  324  KALL        INTEGER                            REFS       79   DEFINED        78
  317  KS          INTEGER                            REFS       64        72   DEFINED        62
  323  LD          INTEGER                            REFS       79        80   DEFINED        77
10545  LDDIM       INTEGER               JGL          REFS        2        93   DEFINED        38        88
10463  LINDEP      INTEGER     ARRAY     JGL          REFS        2        94   DEFINED        45        82
 3411  LMK         REAL        ARRAY     JGL          REFS        2        14       105   DEFINED        73
    0  MAXDIM      INTEGER               MAX          REFS        7        28        62        63
10377  MSTAR       INTEGER               JGL          REFS        2        21        32        42
10630  NDIM        INTEGER               JGL          REFS        2   DEFINED        99
10546  NOTACT      INTEGER     ARRAY     JGL          REFS        2   DEFINED        46        97
10462  NOTDIM      INTEGER               JGL          REFS        2        90   DEFINED        36        87
10400  NOTJ        INTEGER     ARRAY     JGL          REFS        2        91        97   DEFINED        44        85
 5252  NPARM       INTEGER               POWELL       REFS        5        29        55        64        72
  311  SUM         REAL                               REFS       29        64        72   DEFINED        23        57        67
  321  VAR         REAL                               REFS       73   DEFINED        72
   43  XN          REAL        ARRAY     POWELL       REFS        5        29
    0  XO          REAL        ARRAY     POWELL       REFS        5
  322  Z           REAL        ARRAY     POWELL       REFS        5
```

```
VARIABLES     SN  TYPE             RELOCATION
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       ADDCON                 3              79
       SOSCAP    REAL         8              29        64        72

STATEMENT LABELS               DEF LINE   REFERENCES
  253   1       FMT               107         17
  257   2       FMT               108        102
  263   3       FMT               109        105
  266   4       FMT               110        103
  273   5       FMT               111         32
  276   6       FMT               112         31
    0   10                         65         55
   65   20                         75         48
   76   40                         83         47
  101   50                         86         42        74        80
    0   60                         94         93
  130   70                         98         90        95
    0   80                        106        104
    0   100                        30         21

LOOPS   LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
    6   100       J            21 30       11B                EXT REFS
   33   50        J            42 86       51B                EXT REFS  NOT INNER
   45   10        I            55 65       13B                EXT REFS
  110   70        I            90 98       23B                NOT INNER
  116   60        K            93 94        4B        INSTACK
  145   80        I           104 106      20B                EXT REFS  NOT INNER
  150             J           105 105      11B                EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGL         4505               0 JSET    (50)            50 JDIM    (1)              51 G       (1750)
                                   1801 LMK     (2500)        4301 BCOEF   (50)           4351 MSTAR   (1)
                                   4352 NOTJ    (50)          4402 NOTDIM  (1)            4403 LINDEP  (50)
                                   4453 LODIM   (1)           4454 NOTACT  (50)           4504 NDIM    (1)
       CTAPES        50               0 ITAPES  (50)
       POWELL      2732               0 XO      (35)            35 XN      (35)             70 DELX    (35)
                                    105 GRO     (35)           140 GRN     (35)            175 DELG    (35)
                                    210 Z       (35)           245 HO      (1225)         1470 HN      (1225)
                                   2695 HGR     (35)          2730 NPARM   (1)            2731 ICON    (1)
       MAX            1               0 MAXDIM  (1)

STATISTICS
  PROGRAM LENGTH                454B      300
  CM LABELED COMMON LENGTH    16170B     7288
        52000B CM USED
```

```
            SUBROUTINE LMKP1                                                 LMKP1     2
      C                                                                      LMKP1     3
      C     THIS ROUTINE UPDATES THE INVERSE MOMENT MATRIX WITH RESPECT TO K.  LMKP1     4
      C                                                                      LMKP1     5
            COMMON /CTAPES/ ITAPES                                           LMKP1     6
            COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)    LMKP1     7
           1          ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM LMKP1     8
            COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35) LMKP1     9
           1              ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON      LMKP1    10
            COMMON /MAX/ MAXDIM                                              LMKP1    11
            COMMON /MURTS/   YK(35)                                          LMKP1    12
      C                                                                      LMKP1    13
            DIMENSION VK(50),DUM(50),YKGM(50),ITAPES(50)                     LMKP1    14
      C                                                                      LMKP1    15
      CIBM                                                                   LMKP1    16
      C     REAL*8 SUM                                                       LMKP1    17
      CIBM                                                                   LMKP1    18
      C                                                                      LMKP1    19
            REAL LMK                                                         LMKP1    20
      C                                                                      LMKP1    21
      C                                                                      LMKP1    22
            ITAPEW = ITAPES(6)                                               LMKP1    23
            WRITE(ITAPEW,1)                                                  LMKP1    24
            DO 10 I=1,JDIM                                                   LMKP1    25
      CCDC                                                                   LMKP1    26
            SUM = 0.0                                                        LMKP1    27
      CCDC                                                                   LMKP1    28
      CIBM                                                                   LMKP1    29
      C     SUM = 0.DO                                                       LMKP1    30
      CIBM                                                                   LMKP1    31
            I1 = JSET(I)                                                     LMKP1    32
            IS = (I1-1) * MAXDIM + 1                                         LMKP1    33
            DUM(I) = SOSCAP(G,Z,SUM,NPARM,1,1,IS,1)                          LMKP1    34
      10    CONTINUE                                                         LMKP1    35
            DO 20 I=1,JDIM                                                   LMKP1    36
      CCDC                                                                   LMKP1    37
            SUM = 0.0                                                        LMKP1    38
      CCDC                                                                   LMKP1    39
      CIBM                                                                   LMKP1    40
      C     SUM = 0.DO                                                       LMKP1    41
      CIBM                                                                   LMKP1    42
            VK(I) = SOSCAP(LMK,DUM,SUM,JDIM,50,1,I,1)                        LMKP1    43
      20    CONTINUE                                                         LMKP1    44
            DO 30 I=1,JDIM                                                   LMKP1    45
      CCDC                                                                   LMKP1    46
            SUM = 0.0                                                        LMKP1    47
      CCDC                                                                   LMKP1    48
      CIBM                                                                   LMKP1    49
      C     SUM = 0.DO                                                       LMKP1    50
      CIBM                                                                   LMKP1    51
            I1 = JSET(I)                                                     LMKP1    52
            JS = (I1-1) * MAXDIM + 1                                         LMKP1    53
            YKGM(I) = SOSCAP(YK,G,SUM,NPARM,1,1,1,JS)                        LMKP1    54
      30    CONTINUE                                                         LMKP1    55
            DO 40 I=1,JDIM                                                   LMKP1    56
      CCDC                                                                   LMKP1    57
            SUM = 0.0                                                        LMKP1    58
```

```
      CCDC
      CIBM
      C        SUM = 0.D0
      CIBM
               JS = (I-1) * 50 + 1
               DUM(I) = SOSCAP(YKGM,LMK,SUM,JDIM,1,1,1,JS)
      40       CONTINUE
      CCDC
               SUM = 0.0
      CCDC
      CIBM
      C        SUM = 0.D0
      CIBM
               VAL = SOSCAP(YKGM,VK,SUM,JDIM,1,1,1,1) + 1.
               DO 50 I=1,JDIM
               DO 50 J=1,JDIM
      CCDC
               SUM = 0.0
      CCDC
      CIBM
      C        SUM = 0.D0
      CIBM
               LMK(I,J) = LMK(I,J) -  SOSCAP(VK,DUM,SUM,1,1,1,I,J)/VAL
      50       CONTINUE
               WRITE(ITAPEW,2)
               DO 60 I=1,JDIM
               WRITE(ITAPEW,3) (LMK(I,J),J=1,JDIM)
      60       CONTINUE
             1 FORMAT(1H0,10X,14HENTERING LMKP1)
             2 FORMAT(1H0,10X,27HINVERSE MOMENT MATRIX,  LMK,/)
      3        FORMAT(1H0,10X,10(1X,1P1E11.4))
               RETURN
               END
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    1  LMKP1          1          89

VARIABLES      SN  TYPE          RELOCATION
10315  BCOEF       REAL         ARRAY   JGL          REFS       6
  257  DELG        REAL         ARRAY   POWELL       REFS       8
  106  DELX        REAL         ARRAY   POWELL       REFS       8
  337  DUM         REAL         ARRAY                REFS      13       42       80   DEFINED     33      63
   63  G           REAL         ARRAY   JGL          REFS       6       33       53
  214  GRN         REAL         ARRAY   POWELL       REFS       8
  151  GRO         REAL         ARRAY   POWELL       REFS       8
 5207  HGR         REAL         ARRAY   POWELL       REFS       8
 2676  HN          REAL         ARRAY   POWELL       REFS       8
  365  HO          REAL         ARRAY   POWELL       REFS       8
  246  I           INTEGER                           REFS      31       33     2*42      51      53      62      63
                                                      3*80     84  DEFINED     24      35      44      55      72
                                                       83
```

```
VARIABLES      SN  TYPE            RELOCATION
 5253  ICON        INTEGER              POWELL       REFS        8
  251  IS          INTEGER                           REFS       33   DEFINED      32
    0  ITAPES      INTEGER     ARRAY    CTAPES       REFS        5        13      22
  245  ITAPEW      INTEGER                        DEFINED       22   I/O REFS     23       82       84
  250  I1          INTEGER                           REFS       32        52   DEFINED     31       51
  254  J           INTEGER                           REFS     3*80        84   DEFINED     73       84
   62  JDIM        INTEGER              JGL          REFS        6        24      35       42       44      55      63
                                                       71       72        73      83       84
  252  JS          INTEGER                           REFS       53        63   DEFINED     52       62
    0  JSET        INTEGER     ARRAY    JGL          REFS        6        31      51
10545  LDDIM       INTEGER              JGL          REFS        6
10463  LINDEF      INTEGER     ARRAY    JGL          REFS        6
 3411  LMK         REAL        ARRAY    JGL          REFS        6        19      42       63       80      84
                                                  DEFINED       80
    0  MAXDIM      INTEGER              MAX          REFS       10        32      52
10377  MSTAR       INTEGER              JGL          REFS        6
10630  NDIM        INTEGER              JGL          REFS        6
10546  NOTACT      INTEGER     ARRAY    JGL          REFS        6
10462  NOTDIM      INTEGER              JGL          REFS        6
10400  NOTJ        INTEGER     ARRAY    JGL          REFS        6
 5252  NPARM       INTEGER              POWELL       REFS        8        33      53
  247  SUM         REAL                              REFS       33        42      53       63       71      80
                                                  DEFINED       26        37      46       57       66      75
  253  VAL         REAL                              REFS       80   DEFINED      71
  255  VK          REAL        ARRAY                 REFS       13        71      80   DEFINED     42
   43  XN          REAL        ARRAY    POWELL       REFS        8
    0  XO          REAL        ARRAY    POWELL       REFS        8
    0  YK          REAL        ARRAY    MURTS        REFS       11        53
  421  YKGM        REAL        ARRAY                 REFS       13        63      71   DEFINED     53
  322  Z           REAL        ARRAY    POWELL       REFS        8        33
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       SOSCAP      REAL      8              33         42       53        63      71       80

STATEMENT LABELS             DEF LINE   REFERENCES
  225  1        FMT             86         23
  231  2        FMT             87         82
  236  3        FMT             88         84
    0  10                       34         24
    0  20                       43         35
    0  30                       54         44
    0  40                       64         55
    0  50                       81         72         73
    0  60                       85         83

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
    6  10         I         24 34        13B               EXT REFS
   22  20         I         35 43         7B               EXT REFS
   32  30         I         44 54        13B               EXT REFS
   46  40         I         55 64        11B               EXT REFS
   64  50         I         72 81        15B               EXT REFS  NOT INNER
   65  50         J         73 81        11B               EXT REFS
  103  60         I         83 85        20B               EXT REFS  NOT INNER
  106             J         84 84        11B               EXT REFS
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE      REFERENCES
    3  HYPER           1             54

VARIABLES        SN  TYPE              RELOCATION
 10315  BCOEF      REAL       ARRAY    JGL         REFS        6
   257  DELG       REAL       ARRAY    POWELL      REFS        9
   106  DELX       REAL       ARRAY    POWELL      REFS        9       47    DEFINED     45
    63  G          REAL       ARRAY    JGL         REFS        6       35
   214  GRN        REAL       ARRAY    POWELL      REFS        9
   151  GRO        REAL       ARRAY    POWELL      REFS        9
  5207  HGR        REAL       ARRAY    POWELL      REFS        9       45       49
  2676  HN         REAL       ARRAY    POWELL      REFS        9       35
   365  HO         REAL       ARRAY    POWELL      REFS        9
   150  I          INTEGER                         REFS     2*35     2*44     3*45        47       48       49
                                                DEFINED       25       37       47        48       49
  5253  ICON       INTEGER             POWELL      REFS        9
     0  ITAPES     INTEGER    ARRAY    CTAPES      REFS        8       18       23
   147  ITAPEW     INTEGER                      DEFINED       23  I/O REFS      24        47       48       49
   151  J          INTEGER                         REFS       33       35   DEFINED       26
    62  JDIM       INTEGER             JGL         REFS        6       26       44
   154  JJ         INTEGER                         REFS       35  DEFINED       34
     0  JSET       INTEGER    ARRAY    JGL         REFS        6       33
   153  J1         INTEGER                         REFS       34  DEFINED       33
     0  LAM        REAL       ARRAY     F.P.       REFS       17       20       44   DEFINED        1
 10545  LDDIM      INTEGER             JGL         REFS        6
 10463  LINDEP     INTEGER    ARRAY    JGL         REFS        6
  3411  LMK        INTEGER    ARRAY    JGL         REFS        6
     0  MAXDIM     INTEGER             MAX         REFS       11       34       35        44
 10377  MSTAR      INTEGER             JGL         REFS        6
 10630  NDIM       INTEGER             JGL         REFS        6
 10546  NOTACT     INTEGER    ARRAY    JGL         REFS        6
 10462  NOTDIM     INTEGER             JGL         REFS        6
 10400  NOTJ       INTEGER    ARRAY    JGL         REFS        6
  5252  NPARM      INTEGER             POWELL      REFS        9       25       35        37       47       48       49
  3503  SGL        REAL       ARRAY                REFS       17       45       48   DEFINED       44
   155  SKGM       REAL       ARRAY                REFS       17       44   DEFINED       35
   152  SUM        REAL                            REFS       35       44   DEFINED       28       39
    43  XN         REAL       ARRAY    POWELL      REFS        9
     0  XO         REAL       ARRAY    POWELL      REFS        9
   322  Z          REAL       ARRAY    POWELL      REFS        9
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
        SOSCAP      REAL     8              35        44

STATEMENT LABELS              DEF LINE    REFERENCES
   124  1          FMT           50           24
   130  2          FMT           51           47
   135  3          FMT           52           48
   142  4          FMT           53           49
     0  10                       36           25        26
     0  20                       46           37
```

```
      SUBROUTINE HYPER(LAM)
C
C     THIS SUBROUTINE COMPUTES THE PROJECTION OF THE UNCONSTRAINED
C     STEP ONTO THE INTERSECTION OF HYPERSPACES.
C
      COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)
     1            ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NCTACT(50),NDIM
      COMMON /CTAPES/ ITAPES
      COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)
     1                 ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON
      COMMON /MAX/ MAXDIM
C
CIBM
C     REAL*8 SUM
CIBM
C
      DIMENSION SKGM(35,50),SGL(35),LAM(1)
      DIMENSION ITAPES(50)
C
      REAL LAM
C
C
      ITAPEW = ITAPES(6)
      WRITE(ITAPEW,1)
      DO 10 I=1,NPARM
      DO 10 J=1,JDIM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      J1 = JSET(J)
      JJ = (J1 - 1) * MAXDIM + 1
      SKGM(I,J) = SOSCAP(HN,G,SUM,NPARM,MAXDIM,1,I,JJ)
   10 CONTINUE
      DO 20 I=1,NPARM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      SGL(I) = SOSCAP(SKGM,LAM,SUM,JDIM,MAXDIM,1,I,1)
      DELX(I) = SGL(I) - HGR(I)
   20 CONTINUE
      WRITE(ITAPEW,2) (DELX(I),I=1,NPARM)
      WRITE(ITAPEW,3) (SGL(I),I=1,NPARM)
      WRITE(ITAPEW,4) (HGR(I),I=1,NPARM)
    1 FORMAT(1HO,/,10X,14HENTERING HYPER)
    2 FORMAT(//10X,14HDELX TRANSPOSE//5(2X,1PE12.5))
    3 FORMAT(//10X,9HSK*GM*LAM//5(2X,1PE12.5))
    4 FORMAT(//10X,6HSK*GRN//5(2X,1PE12.5))
      RETURN
      END
```

```
COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
                                  4352 NGTJ    (50)            4402 NOTDIM (1)             4403 LINDEP (50)
                                  4453 LDDIM   (1)             4454 NOTACT (50)            4504 NDIM   (1)
       CTAPES       50               0 ITAPES (50)
       POWELL     2732               0 XO      (35)              35 XN     (35)              70 DELX   (35)
                                   105 GRO     (35)             140 GRN    (35)             175 DELG   (35)
                                   210 Z       (35)             245 HO     (1225)          1470 HN     (1225)
                                  2695 HGR     (35)            2730 NPARM  (1)             2731 ICON   (1)
       MAX           1               0 MAXDIM (1)

STATISTICS
  PROGRAM LENGTH                  210B      136
  CM LABELED COMMON LENGTH      16170B     7288
        52000B CM USED
```

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  LAGMUL          1           48

VARIABLES      SN  TYPE           RELOCATION
10315  BCOEF       REAL        ARRAY    JGL           REFS          6
  257  DELG        REAL        ARRAY    POWELL        REFS          9
  106  DELX        REAL        ARRAY    POWELL        REFS          9
  124  DUM         REAL        ARRAY                  REFS         13        41    DEFINED      32
   63  G           REAL        ARRAY    JGL           REFS          6        32
  214  GRN         REAL        ARRAY    POWELL        REFS          9
  151  GRO         REAL        ARRAY    POWELL        REFS          9
 5207  HGR         REAL        ARRAY    POWELL        REFS          9        32
 2676  HN          REAL        ARRAY    POWELL        REFS          9
  365  HO          REAL        ARRAY    POWELL        REFS          9
 5253  ICON        INTEGER              POWELL        REFS          9
    0  ITAPES      INTEGER     ARRAY    CTAPES        REFS          8        14        21
  117  ITAPEW      INTEGER                         DEFINED         21   I/O REFS      22        43        44
  120  J           INTEGER                            REFS         30        32      2*41        44   DEFINED       23        34
                                                       44
   62  JDIM        INTEGER              JGL           REFS          6        23        34        41        44
  123  JS          INTEGER                            REFS         32   DEFINED      31
    0  JSET        INTEGER     ARRAY    JGL           REFS          6        30
  122  J1          INTEGER                            REFS         31   DEFINED      30
    0  LAM         REAL        ARRAY     F.P.         REFS         13        20        44   DEFINED        1        41
10545  LDDIM       INTEGER              JGL           REFS          6
10463  LINDEP      INTEGER     ARRAY    JGL           REFS          6
 3411  LMK         INTEGER     ARRAY    JGL           REFS          6        41
    0  MAXDIM      INTEGER              MAX           REFS         11        31
10377  MSTAR       INTEGER              JGL           REFS          6
10630  NDIM        INTEGER              JGL           REFS          6
10546  NOTACT      INTEGER     ARRAY    JGL           REFS          6
10462  NOTDIM      INTEGER              JGL           REFS          6
10400  NOTJ        INTEGER     ARRAY    JGL           REFS          6
 5252  NPARM       INTEGER              POWELL        REFS          9        32
  121  SUM         REAL                               REFS         32        41    DEFINED      25        36
   43  XN          REAL        ARRAY    POWELL        REFS          9
    0  XO          REAL        ARRAY    POWELL        REFS          9
  322  Z           REAL        ARRAY    POWELL        REFS          9
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS          REFERENCES
       SOSCAP       REAL     8               32         41

STATEMENT LABELS              DEF LINE    REFERENCES
  100  1         FMT             45          22
  104  2         FMT             46          44
  110  3         FMT             47          43
    0  20                        33          23
    0  30                        42          34

LOOPS  LABEL      INDEX     FROM-TO     LENGTH     PROPERTIES
   12  20         J          23 33        13B                EXT REFS
   26  30         J          34 42         7B                EXT REFS

COMMON BLOCKS     LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGL         4505             0 JSET    (50)            50 JDIM   (1)             51 G       (1750)
                                 1801 LMK     (2500)        4301 BCOEF  (50)          4351 MSTAR   (1)
```

```
              SUBROUTINE LAGMUL(LAM)                                             LAGMUL      2
        C                                                                        LAGMUL      3
        C     THIS SUBROUTINE CALCULATES LAGRANGE MULTIPLIERS FOR JDIM           LAGMUL      4
        C     CONSTRAINTS.                                                       LAGMUL      5
        C                                                                        LAGMUL      6
              COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)      LAGMUL      7
             1          ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM  LAGMUL      8
              COMMON /CTAPES/ ITAPES                                             LAGMUL      9
              COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)  LAGMUL     10
             1                 ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON     LAGMUL     11
              COMMON /MAX/ MAXDIM                                                LAGMUL     12
        C                                                                        LAGMUL     13
              DIMENSION LAM(1),DUM(50)                                           LAGMUL     14
              DIMENSION ITAPES(50)                                               LAGMUL     15
        C                                                                        LAGMUL     16
        CIBM                                                                     LAGMUL     17
        C     REAL*8 SUM                                                         LAGMUL     18
        CIBM                                                                     LAGMUL     19
        C                                                                        LAGMUL     20
              REAL LAM                                                           LAGMUL     21
              ITAPEW = ITAPES(6)                                                 LAGMUL     22
              WRITE(ITAPEW,1)                                                    LAGMUL     23
              DO 20 J=1,JDIM                                                     LAGMUL     24
        CCDC                                                                     LAGMUL     25
              SUM = 0.0                                                          LAGMUL     26
        CCDC                                                                     LAGMUL     27
        CIBM                                                                     LAGMUL     28
        C     SUM = 0.DO                                                         LAGMUL     29
        CIBM                                                                     LAGMUL     30
              J1 = JSET(J)                                                       LAGMUL     31
              JS = (J1-1) * MAXDIM + 1                                           LAGMUL     32
              DUM(J) = SOSCAP(G,HGR,SUM,NPARM,1,1,JS,1)                          LAGMUL     33
        20    CONTINUE                                                           LAGMUL     34
              DO 30 J=1,JDIM                                                     LAGMUL     35
        CCDC                                                                     LAGMUL     36
              SUM = 0.0                                                          LAGMUL     37
        CCDC                                                                     LAGMUL     38
        CIBM                                                                     LAGMUL     39
        C     SUM = 0.DO                                                         LAGMUL     40
        CIBM                                                                     LAGMUL     41
              LAM(J) = SOSCAP(LMK,DUM,SUM,JDIM,50,1,J,1)                         LAGMUL     42
        30    CONTINUE                                                           LAGMUL     43
              WRITE(ITAPEW,3)                                                    LAGMUL     44
              WRITE(ITAPEW,2) (LAM(J),J=1,JDIM)                                  LAGMUL     45
            1 FORMAT(1HO,/,10X,15HENTERING LAGMUL)                               LAGMUL     46
        2     FORMAT(1HO,10X,10(1X,1P1E11.4))                                    LAGMUL     47
            3 FORMAT(1HO,10X,26HLAGRANGE MULTIPLIERS,  LAM)                      LAGMUL     48
              RETURN                                                             LAGMUL     49
              END                                                                LAGMUL     50
```

SYMBOLIC REFERENCE MAP (R=3)

```
LOOPS  LABEL   INDEX    FROM-TO    LENGTH   PROPERTIES
  251  120     J        189 197      11B              EXT REFS
  275  130     K        199 202       3B     INSTACK
  306  140     I        206 208      20B              EXT REFS  NOT INNER
  311          J        207 207      11B              EXT REFS
  340  150     I        221 226      10B        OPT
  364  155     I        236 241      10B        OPT

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       JGL        4505            0 JSET    (50)           50 JDIM   (1)           51 G      (1750)
                               1801 LMK     (2500)       4301 BCOEF  (50)        4351 MSTAR  (1)
                               4352 NOTJ    (50)         4402 NOTDIM (1)         4403 LINDEP (50)
                               4453 LDDIM   (1)          4454 NOTACT (50)        4504 NDIM   (1)
       CTAPES       50            0 ITAPES  (50)
       POWELL     2732            0 XO      (35)           35 XN     (35)           70 DELX   (35)
                                105 GRO     (35)          140 GRN    (35)          175 DELG   (35)
                                210 Z       (35)          245 HO     (1225)        1470 HN     (1225)
                               2695 HGR     (35)         2730 NPARM  (1)         2731 ICON   (1)
       MAX           1            0 MAXDIM  (1)

STATISTICS
  PROGRAM LENGTH               12646B    5542
  CM LABELED COMMON LENGTH     16170B    7288
          52000B CM USED
```

```
VARIABLES     SN  TYPE          RELOCATION
                                              DEFINED      38       50       61       70       86      113      123
                                                  133     142      153      162      171      180      191
  675  VAL        REAL                          REFS       94       95
   43  XN         REAL       ARRAY   POWELL     REFS        9
    0  XO         REAL       ARRAY   POWELL     REFS        9
  322  Z          REAL       ARRAY   POWELL     REFS        9
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
       NRM2                 3             94
       SOSCAP     REAL      8             45       76       92      119      130      139      149      158      167
                                         176      186      196

STATEMENT LABELS            DEF LINE   REFERENCES
  622  1       FMT             246         26
  631  2       FMT             248        207
  634  3       FMT             249        244
  640  4       FMT             250        205
  574  5       FMT             100         99
    0  10                       46         35       36
   17  11                       31         27
    0  20                       63         55
    0  30                       66         47       48
    0  40                       78         67       68
    0  50                       93         84
  135  60                      107         95
    0  70                      120        111
    0  80                      131        121
    0  90                      150        140
    0  95                      159        151
    0  100                     168        160
  564  102     FMT  NO REFS     65
  645  108     FMT             251         28
    0  110                     187        178
    0  120                     197        188      189
    0  130                     202        199
    0  140                     208        206
  347  150                     226        221      224
  373  155                     241        236      239
  377  160                     243        214      232      233

LOOPS  LABEL     INDEX     FROM-TO     LENGTH    PROPERTIES
   20  10        I          35 46        17B              EXT REFS  NOT INNER
   21  10        J          36 46        14B              EXT REFS
   40  30        I          47 66        27B              NOT INNER
   41  30        J          48 66        23B              NOT INNER
   47  20        K          55 63         7B      INSTACK
   70  40        I          67 78        20B              EXT REFS  NOT INNER
   71  40        J          68 78        15B              EXT REFS
  111  50        I          84 93        11B              EXT REFS
  136  70        I         111 120       11B              EXT REFS
  150  80        I         121 131       13B              EXT REFS
  172  90        I         140 150       13B              EXT REFS
  206  95        I         151 159        7B              EXT REFS
  216  100       I         160 168        7B              EXT REFS
  236  110       I         178 187       11B              EXT REFS
  250  120       I         188 197       15B              EXT REFS  NOT INNER
```

```
VARIABLES      SN  TYPE           RELOCATION
                                              129      130      147      149    2*158    2*167      185      186
                                            3*196      207      222      223      225      237      238      240
                                          DEFINED       35       47       67       84      111      121      140
                                              151      160      178      188      206      221      236
  5253  ICON      INTEGER            POWELL  REFS        9
   676  IS        INTEGER                    REFS      130      149  DEFINED      128      148
     0  ITAPES    INTEGER   ARRAY    CTAPES  REFS        8       21       25
   665  ITAPEW    INTEGER                 DEFINED       25 I/O REFS       26       28       99      205      207
                                              244
   700  I1        INTEGER                    REFS      148  DEFINED      147
   667  J         INTEGER                    REFS       43       45       61       64       75       76     3*77
                                            3*196      207      244  DEFINED       36       48       68      189
                                              207      244
    62  JDIM      INTEGER            JGL     REFS        6       36       47       55       76      121      140
                                              151      158      167      178      186      188      189      198
                                              199      213      244  DEFINED      212
   703  JDIM1     INTEGER                    REFS      200      201    2*203      206      207      212
                                          DEFINED      198
     0  JNEW      INTEGER            F.P.    REFS       26       27       28       91       99      105      118
                                              128      138      169      213      223      238
                                          DEFINED        1       29
   672  JS        INTEGER                    REFS       45       76       92      119      130      139      176
                                              186  DEFINED       44       75       91      118      129      138
                                              169      185
     0  JSET      INTEGER   ARRAY    JGL     REFS        6       43       56      147      244
                                          DEFINED      213
   705  JTEST     INTEGER                    REFS      224      239  DEFINED      220      223      235      238
   671  J1        INTEGER                    REFS       44  DEFINED       43
   673  K         INTEGER                    REFS       56       61    2*200    2*201  DEFINED       55      199
     0  KALL      INTEGER            F.P.    REFS      103      214      232  DEFINED        1
   674  K1        INTEGER                    REFS       61  DEFINED       56
     0  LD        INTEGER            F.P. DEFINED        1      102
 10545  LDDIM     INTEGER            JGL     REFS        6      104      105      233      234
                                          DEFINED      104      242
   707  LD1       INTEGER                    REFS      236      242  DEFINED      234
 10463  LINDEP    INTEGER   ARRAY    JGL     REFS        6       27      238      240  DEFINED      105      240
  3411  LMK       REAL      ARRAY    JGL     REFS        6       18       61      158      186      196      207
                                          DEFINED      196      200      201      203
   710  LMKGMT    REAL      ARRAY            REFS       18       22       76  DEFINED       64
     0  MAXDIM    INTEGER            MAX     REFS       11       44       45       76       91       92      118
                                              119      128      129      138      148      167      169
 10377  MSTAR     INTEGER            JGL     REFS        6
 10630  NDIM      INTEGER            JGL     REFS        6
 10546  NOTACT    INTEGER   ARRAY    JGL     REFS        6
 10462  NOTDIM    INTEGER            JGL     REFS        6      219      227  DEFINED      228
 10400  NOTJ      INTEGER   ARRAY    JGL     REFS        6      223      225  DEFINED      225      227
   704  NOT1      INTEGER                    REFS      221      228  DEFINED      219
  5252  NPARM     INTEGER            POWELL  REFS        9       35       45       48       67       68       84
                                               92       94      111      119      130      139      149      160
                                              176
   706  N1        INTEGER                    REFS      225      240  DEFINED      222      237
 10264  PROJ      REAL      ARRAY            REFS       23       77       92  DEFINED       76       77
 12575  PROJG     REAL      ARRAY            REFS       23       94  DEFINED       92
  4464  SKGM      REAL      ARRAY            REFS       20       76      130      167  DEFINED       45
 10012  SKGMP1    REAL      ARRAY            REFS       22      139      149  DEFINED      119
   670  SUM       REAL                       REFS       45       61       64       76       92      119      130
                                              139      149      158      167      176      186      196
```

```
               C                                                                            ADDCON     230
               C      UPDATE LINDEP IF CALLED FROM CONSTR                                   ADDCON     231
               C                                                                            ADDCON     232
                      IF(KALL.EQ.2) GO TO 160                                               ADDCON     233
                      IF(LDDIM.EQ.O) GO TO 160                                              ADDCON     234
                      LD1 = LDDIM - 1                                                       ADDCON     235
                      JTEST = O                                                             ADDCON     236
                      DO 155 I=1,LD1                                                        ADDCON     237
                      N1 = I+1                                                              ADDCON     238
                      IF(LINDEP(I).EQ.JNEW) JTEST = 1                                       ADDCON     239
                      IF(JTEST.NE.1) GO TO 155                                              ADDCON     240
                      LINDEP(I) = LINDEP(N1)                                                ADDCON     241
               155    CONTINUE                                                              ADDCON     242
                      LDDIM = LD1                                                           ADDCON     243
               160    CONTINUE                                                              ADDCON     244
                      WRITE(ITAPEW,3) (JSET(J),J=1,JDIM)                                    ADDCON     245
               C                                                                            ADDCON     246
                    1 FORMAT(1HO,/,10X,27HENTERING ADDCON, CONSTRAINT,I4,12H TO BE ADDED    ADDCON     247
                     1)                                                                     ADDCON     248
               2      FORMAT(10X,10(1X,1P1E11.4))                                           ADDCON     249
                    3 FORMAT(1HO,10X,7HJSET = ,10I5)                                        ADDCON     250
                    4 FORMAT(1HO,10X,27HINVERSE MOMENT MATRIX,  LMK,/)                      ADDCON     251
                  108 FORMAT(1HO,5X,11HCONSTRAINT ,I3,29HWAS LINEARLY DEPENDENT DURING,     ADDCON     252
                     144H THIS STEP. IT SHOULD NOT BE ADDED TO BASIS.)                      ADDCON     253
                      RETURN                                                                ADDCON     254
                      END                                                                   ADDCON     255
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  ADDCON           1           30        103        106        253

VARIABLES      SN  TYPE           RELOCATION
   701  AZERO     REAL                              REFS      177      196   DEFINED     176
   702  AZINV     REAL                              REFS      186      203   DEFINED     177
  4236  A21       REAL        ARRAY                 REFS       20      186   DEFINED     130
  4320  A21LMK    REAL       *UNDEF                 REFS       20
   677  A22       REAL                              REFS      176  DEFINED      139
 10315  BCOEF     REAL        ARRAY     JGL         REFS        6
  4402  B21       REAL        ARRAY                 REFS       20    2*196      200       201    DEFINED      186
   257  DELG      REAL        ARRAY     POWELL      REFS        9
   106  DELX      REAL        ARRAY     POWELL      REFS        9
 10055  DUM1      REAL        ARRAY                 REFS       22      158   DEFINED     149
 10137  DUM2      REAL        ARRAY                 REFS       22      176   DEFINED     167
 10202  DUM3      REAL        ARRAY                 REFS       22      167   DEFINED     158
    63  G         REAL        ARRAY     JGL         REFS        6       45       61        92       119       130       139
                                                     149      176
   214  GRN       REAL        ARRAY     POWELL      REFS        9
   151  GRO       REAL        ARRAY     POWELL      REFS        9
  5207  HGR       REAL        ARRAY     POWELL      REFS        9
  2676  HN        REAL        ARRAY     POWELL      REFS        9       45      119
   365  HO        REAL        ARRAY     POWELL      REFS        9
   666  I         INTEGER                           REFS     2*45       61       64      2*76      3*77      2*92      2*119
```

```
CCDC                                                                    ADDCON 173
CIBM                                                                    ADDCON 174
C     SUM = 0.DO                                                        ADDCON 175
CIBM                                                                    ADDCON 176
      AZERO = A22 - SOSCAP(G,DUM2,SUM,NPARM,1,1,JS,1)                   ADDCON 177
      AZINV = 1./AZERO                                                  ADDCON 178
      DO 110 I=1,JDIM                                                   ADDCON 179
CCDC                                                                    ADDCON 180
      SUM = 0.0                                                         ADDCON 181
CCDC                                                                    ADDCON 182
CIBM                                                                    ADDCON 183
C     SUM = 0.DO                                                        ADDCON 184
CIBM                                                                    ADDCON 185
      JS = (I-1) * 50 + 1                                               ADDCON 186
      B21(I) = -AZINV * SOSCAP(A21,LMK,SUM,JDIM,1,1,1,JS)               ADDCON 187
  110 CONTINUE                                                          ADDCON 188
      DO 120 I=1,JDIM                                                   ADDCON 189
      DO 120 J=1,JDIM                                                   ADDCON 190
CCDC                                                                    ADDCON 191
      SUM = 0.0                                                         ADDCON 192
CCDC                                                                    ADDCON 193
CIBM                                                                    ADDCON 194
C     SUM = 0.DO                                                        ADDCON 195
CIBM                                                                    ADDCON 196
      LMK(I,J) = LMK(I,J) + AZERO * SOSCAP(B21,B21,SUM,1,1,1,I,J)       ADDCON 197
  120 CONTINUE                                                          ADDCON 198
      JDIM1 = JDIM + 1                                                  ADDCON 199
      DO 130 K=1,JDIM                                                   ADDCON 200
      LMK(JDIM1,K) = B21(K)                                             ADDCON 201
      LMK(K,JDIM1) = B21(K)                                             ADDCON 202
  130 CONTINUE                                                          ADDCON 203
      LMK(JDIM1,JDIM1) = AZINV                                          ADDCON 204
C                                                                       ADDCON 205
      WRITE(ITAPEW,4)                                                   ADDCON 206
      DO 140 I=1,JDIM1                                                  ADDCON 207
      WRITE(ITAPEW,2) (LMK(I,J), J=1,JDIM1)                             ADDCON 208
  140 CONTINUE                                                          ADDCON 209
C                                                                       ADDCON 210
C     UPDATE JSET                                                       ADDCON 211
C                                                                       ADDCON 212
      JDIM = JDIM1                                                      ADDCON 213
      JSET(JDIM) = JNEW                                                 ADDCON 214
      IF(KALL.EQ.0) GO TO 160                                           ADDCON 215
C                                                                       ADDCON 216
C                                                                       ADDCON 217
C     UPDATE NOTJ WHEN ADDCON IS CALLED FROM CONSTR OR LDFIX            ADDCON 218
C                                                                       ADDCON 219
      NOT1 = NOTDIM - 1                                                 ADDCON 220
      JTEST = 0                                                         ADDCON 221
      DO 150 I=1,NOT1                                                   ADDCON 222
      N1 = I+1                                                          ADDCON 223
      IF(NOTJ(I).EQ.JNEW) JTEST = 1                                     ADDCON 224
      IF(JTEST.NE.1) GO TO 150                                          ADDCON 225
      NOTJ(I) = NOTJ(N1)                                                ADDCON 226
  150 CONTINUE                                                          ADDCON 227
      NOTJ(NOTDIM) = 0                                                  ADDCON 228
      NOTDIM = NOT1                                                     ADDCON 229
```

```
      CIBM                                                               ADDCON   116
      C    SUM = 0.DO                                                    ADDCON   117
      CIBM                                                               ADDCON   118
           JS = (JNEW-1) * MAXDIM + 1                                    ADDCON   119
           SKGMP1(I) = SOSCAP(HN,G,SUM,NPARM,MAXDIM,1,I,JS)              ADDCON   120
      70   CONTINUE                                                      ADDCON   121
           DO 80 I=1,JDIM                                                ADDCON   122
      CCDC                                                               ADDCON   123
           SUM = 0.0                                                     ADDCON   124
      CCDC                                                               ADDCON   125
      CIBM                                                               ADDCON   126
      C    SUM = 0.DO                                                    ADDCON   127
      CIBM                                                               ADDCON   128
           IS = (JNEW - 1) * MAXDIM + 1                                  ADDCON   129
           JS = (I-1) * MAXDIM + 1                                       ADDCON   130
           A21(I) = SOSCAP(G,SKGM,SUM,NPARM,1,1,IS,JS)                   ADDCON   131
      80   CONTINUE                                                      ADDCON   132
      CCDC                                                               ADDCON   133
           SUM = 0.0                                                     ADDCON   134
      CCDC                                                               ADDCON   135
      CIBM                                                               ADDCON   136
      C    SUM = 0.DO                                                    ADDCON   137
      CIBM                                                               ADDCON   138
           JS = (JNEW-1) * MAXDIM + 1                                    ADDCON   139
           A22 = SOSCAP(G,SKGMP1,SUM,NPARM,1,1,JS,1)                     ADDCON   140
           DO 90 I=1,JDIM                                                ADDCON   141
      CCDC                                                               ADDCON   142
           SUM = 0.0                                                     ADDCON   143
      CCDC                                                               ADDCON   144
      CIBM                                                               ADDCON   145
      C    SUM = 0.DO                                                    ADDCON   146
      CIBM                                                               ADDCON   147
           I1 = JSET(I)                                                  ADDCON   148
           IS = (I1 - 1) * MAXDIM + 1                                    ADDCON   149
           DUM1(I) = SOSCAP(G,SKGMP1,SUM,NPARM,1,1,IS,1)                 ADDCON   150
      90   CONTINUE                                                      ADDCON   151
           DO 95 I=1,JDIM                                                ADDCON   152
      CCDC                                                               ADDCON   153
           SUM = 0.0                                                     ADDCON   154
      CCDC                                                               ADDCON   155
      CIBM                                                               ADDCON   156
      C    SUM = 0.DO                                                    ADDCON   157
      CIBM                                                               ADDCON   158
           DUM3(I) = SOSCAP(LMK,DUM1,SUM,JDIM,50,1,I,1)                  ADDCON   159
      95   CONTINUE                                                      ADDCON   160
           DO 100 I=1,NPARM                                              ADDCON   161
      CCDC                                                               ADDCON   162
           SUM = 0.0                                                     ADDCON   163
      CCDC                                                               ADDCON   164
      CIBM                                                               ADDCON   165
      C    SUM = 0.DO                                                    ADDCON   166
      CIBM                                                               ADDCON   167
           DUM2(I) = SOSCAP(SKGM,DUM3,SUM,JDIM,MAXDIM,1,I,1)             ADDCON   168
      100  CONTINUE                                                      ADDCON   169
           JS = (JNEW - 1) * MAXDIM + 1                                  ADDCON   170
      CCDC                                                               ADDCON   171
           SUM = 0.0                                                     ADDCON   172
```

```
C     SUM = SUM + DBLE(LMK(I,K)) * DBLE(G(J,K1))
CIBM
CCDC
      SUM = SUM + LMK(I,K) * G(J,K1)
CCDC
20    CONTINUE
      LMKGMT(I,J) = SUM
  102 FORMAT(5X,7HLMKGMT ,1P1E12.5)
30    CONTINUE
      DO 40 I=1,NPARM
      DO 40 J=1,NPARM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      JS = (J-1) * 50 + 1
      PROJ(I,J) = -SOSCAP(SKGM,LMKGMT,SUM,JDIM,MAXDIM,1,I,JS)
      IF(I.EQ.J) PROJ(I,J) = 1. + PROJ(I,J)
40    CONTINUE
C
C     PROJECT THE NEW CONSTRAINT ONTO THE HYPERPLANE.  IF THE VALUE IS
C     ZERO THE CONSTRAINT IS NOT LINEARLY INDEPENDENT AND SHOULD NOT
C     BE ADDED.
C
      DO 50 I=1,NPARM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.D0
CIBM
      JS = (JNEW-1) * MAXDIM + 1
      PROJG(I) = SOSCAP(PROJ,G,SUM,NPARM,MAXDIM,1,I,JS)
50    CONTINUE
      CALL NRM2(PROJG,VAL,NPARM)
      IF(VAL.GT.1.E-04) GO TO 60
C
C     JNEW IS LD AND SHOULD NOT BE ADDED
C
      WRITE(ITAPEW,5) JNEW
    5 FORMAT(1HO,10X,11HCONSTRAINT ,I3,44H IS LINEARLY DEPENDENT, IT WIL
     1L NOT BE ADDED)
      LD = 1
      IF(KALL.EQ.O) RETURN
      LDDIM = LDDIM + 1
      LINDEP(LDDIM) = JNEW
      RETURN
60    CONTINUE
C
C     UPDATE LMK
C
      DO 70 I=1,NPARM
CCDC
      SUM = 0.0
CCDC
```

```
      SUBROUTINE ADDCON(JNEW,KALL,LD)                                   ADDCON   2
C                                                                       ADDCON   3
C     THIS SUBROUTINE IS TO UPDATE JSET AND LMK ARRAYS WHEN ADDING      ADDCON   4
C     A CONSTRAINT.                                                     ADDCON   5
C                                                                       ADDCON   6
      COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)     ADDCON   7
     1          ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM ADDCON   8
      COMMON /CTAPES/ ITAPES                                            ADDCON   9
      COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35) ADDCON  10
     1                 ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON    ADDCON  11
      COMMON /MAX/ MAXDIM                                               ADDCON  12
C                                                                       ADDCON  13
C                                                                       ADDCON  14
C                                                                       ADDCON  15
CIBM                                                                    ADDCON  16
C     REAL*8 SUM                                                        ADDCON  17
CIBM                                                                    ADDCON  18
      REAL LMK,LMKGMT                                                   ADDCON  19
C                                                                       ADDCON  20
      DIMENSION A21(50),A21LMK(50),B21(50),SKGM(35,50)                  ADDCON  21
      DIMENSION ITAPES(50)                                              ADDCON  22
      DIMENSION SKGMP1(35),LMKGMT(50,35),DUM1(50),DUM2(35),DUM3(50)     ADDCON  23
      DIMENSION PROJ(35,35),PROJG(35)                                   ADDCON  24
C                                                                       ADDCON  25
      ITAPEW = ITAPES(6)                                                ADDCON  26
      WRITE(ITAPEW,1) JNEW                                              ADDCON  27
      IF(LINDEP(JNEW).NE.1) GO TO 11                                    ADDCON  28
      WRITE(ITAPEW,108) JNEW                                            ADDCON  29
      JNEW = 0                                                          ADDCON  30
      RETURN                                                            ADDCON  31
   11 CONTINUE                                                          ADDCON  32
C                                                                       ADDCON  33
C      SET UP PROJECTION OPERATOR                                       ADDCON  34
C                                                                       ADDCON  35
      DO 10 I=1,NPARM                                                   ADDCON  36
      DO 10 J=1,JDIM                                                    ADDCON  37
CCDC                                                                    ADDCON  38
      SUM = 0.0                                                         ADDCON  39
CCDC                                                                    ADDCON  40
CIBM                                                                    ADDCON  41
C     SUM = 0.DO                                                        ADDCON  42
CIBM                                                                    ADDCON  43
      J1 = JSET(J)                                                      ADDCON  44
      JS = (J1-1) * MAXDIM + 1                                          ADDCON  45
      SKGM(I,J) = SOSCAP(HN,G,SUM,NPARM,MAXDIM,1,I,JS)                  ADDCON  46
   10 CONTINUE                                                          ADDCON  47
      DO 30 I=1,JDIM                                                    ADDCON  48
      DO 30 J=1,NPARM                                                   ADDCON  49
CCDC                                                                    ADDCON  50
      SUM = 0.0                                                         ADDCON  51
CCDC                                                                    ADDCON  52
CIBM                                                                    ADDCON  53
C     SUM = 0.DO                                                        ADDCON  54
CIBM                                                                    ADDCON  55
      DO 20 K=1,JDIM                                                    ADDCON  56
      K1 = JSET(K)                                                      ADDCON  57
CIBM                                                                    ADDCON  58
```

```
COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50             0 ITAPES (50)
       JGL        4505             0 JSET   (50)          50 JDIM   (1)            51 G      (1750)
                                1801 LMK    (2500)      4301 BCOEF  (50)         4351 MSTAR  (1)
                                4352 NOTJ   (50)        4402 NOTDIM (1)          4403 LINDEP (50)
                                4453 LDDIM  (1)         4454 NOTACT (50)         4504 NDIM   (1)
       POWELL     2732             0 XO     (35)          35 XN     (35)           70 DELX   (35)
                                 105 GRO    (35)         140 GRN    (35)          175 DELG   (35)
                                 210 Z      (35)         245 HO     (1225)       1470 HN     (1225)
                                2695 HGR    (35)        2730 NPARM  (1)          2731 ICON   (1)
       MAX           1             0 MAXDIM (1)
       MURTS        35             0 YK     (35)

STATISTICS
  PROGRAM LENGTH                503B     323
  CM LABELED COMMON LENGTH    16233B    7323
         52000B CM USED
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   12  10       I           25 36        17B               EXT REFS  NOT INNER
   13  10       J           26 36        14B               EXT REFS
   32  20       I           37 46        11B               EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGL        4505                 0 JSET    (50)                50 JDIM   (1)                  51 G      (1750)
                                    1801 LMK     (2500)            4301 BCOEF  (50)               4351 MSTAR  (1)
                                    4352 NOTJ    (50)              4402 NOTDIM (1)                4403 LINDEP (50)
                                    4453 LDDIM   (1)               4454 NOTACT (50)               4504 NDIM   (1)
       CTAPES       50                 0 ITAPES (50)
       POWELL     2732                 0 XO      (35)                35 XN     (35)                 70 DELX   (35)
                                     105 GRO     (35)               140 GRN    (35)                175 DELG   (35)
                                     210 Z       (35)               245 HO     (1225)             1470 HN     (1225)
                                    2695 HGR     (35)              2730 NPARM  (1)                2731 ICON   (1)
       MAX           1                 0 MAXDIM (1)

STATISTICS
  PROGRAM LENGTH                3550B      1896
  CM LABELED COMMON LENGTH     16170B      7288
          52000B CM USED
```

```
     1                SUBROUTINE LDFIX                                                        LDFIX     2
               C                                                                              LDFIX     3
               C      THIS ROUTINE CHECKS TO SEE IF ANY OF THE CONSTRAINTS WHICH              LDFIX     4
               C      WERE PREVIOUSLY LINEARLY DEPENDENT ARE NOW INDEPENDENT                  LDFIX     5
     5         C                                                                              LDFIX     6
                      COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)           LDFIX     7
                     1           ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM      LDFIX     8
                      COMMON /CTAPES/ ITAPES                                                  LDFIX     9
               C                                                                              LDFIX    10
    10                DIMENSION LTEMP(50),ITAPES(50)                                          LDFIX    11
               C                                                                              LDFIX    12
                      ITAPEW = ITAPES(6)                                                      LDFIX    13
                      WRITE(6,1)                                                              LDFIX    14
                      LDIM = LDDIM                                                            LDFIX    15
    15                LDDIM = 0                                                               LDFIX    16
                      DO 10 I=1,LDIM                                                          LDFIX    17
                      LTEMP(I) = LINDEP(I)                                                    LDFIX    18
                      LINDEP(I) = 0                                                           LDFIX    19
                10    CONTINUE                                                                LDFIX    20
    20                IND = 0                                                                 LDFIX    21
                      DO 20 I=1,LDIM                                                          LDFIX    22
                      JN = LTEMP(I)                                                           LDFIX    23
                      KALL = 2                                                                LDFIX    24
                      LD = 0                                                                  LDFIX    25
    25                CALL ADDCON(JN,KALL,LD)                                                 LDFIX    26
                      IF(LD.EQ.0) GO TO 20                                                    LDFIX    27
                      IND = IND + 1                                                           LDFIX    28
                      LINDEP(IND) = JN                                                        LDFIX    29
                20    CONTINUE                                                                LDFIX    30
    30                LDDIM = IND                                                             LDFIX    31
                    1 FORMAT(1H0,10X,14HENTERING LDFIX)                                       LDFIX    32
                      RETURN                                                                  LDFIX    33
                      END                                                                     LDFIX    34
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    1  LDFIX          1            32

VARIABLES      SN  TYPE          RELOCATION
10315  BCOEF       REAL       ARRAY   JGL          REFS        6
   63  G           REAL       ARRAY   JGL          REFS        6
   54  I           INTEGER                         REFS     2*17        18        22    DEFINED     16     21
   55  IND         INTEGER                         REFS       27        28        30    DEFINED     20     27
    0  ITAPES      INTEGER    ARRAY   CTAPES       REFS        8        10        12
   52  ITAPEW   *  INTEGER                      DEFINED       12
   62  JDIM        INTEGER            JGL          REFS        6
   56  JN          INTEGER                         REFS       25        28   DEFINED        22
    0  JSET        INTEGER    ARRAY   JGL          REFS        6
   57  KALL        INTEGER                         REFS       25   DEFINED        23
   60  LD          INTEGER                         REFS       25        26   DEFINED        24
10545  LDDIM       INTEGER            JGL          REFS        6        14   DEFINED        15     30
   53  LDIM        INTEGER                         REFS       16        21   DEFINED        14
```

```
VARIABLES      SN  TYPE            RELOCATION
10463  LINDEP     INTEGER    ARRAY    JGL          REFS           6        17    DEFINED       18         28
 3411  LMK        INTEGER    ARRAY    JGL          REFS           6
   61  LTEMP      INTEGER    ARRAY                 REFS          10        22    DEFINED       17
10377  MSTAR      INTEGER             JGL          REFS           6
10630  NDIM       INTEGER             JGL          REFS           6
10546  NOTACT     INTEGER    ARRAY    JGL          REFS           6
10462  NOTDIM     INTEGER             JGL          REFS           6
10400  NOTJ       INTEGER    ARRAY    JGL          REFS           6

FILE NAMES         MODE
       TAPE6      FMT                   WRITES        13

EXTERNALS           TYPE   ARGS         REFERENCES
       ADDCON                 3             25

STATEMENT LABELS                DEF LINE   REFERENCES
   46   1        FMT                31         13
    0  10                           19         16
   32  20                           29         21         26

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES       .
   12  10        I            16 19         3B       INSTACK
   20  20        I            21 29        15B                 EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGL          4505                0 JSET    (50)             50 JDIM    (1)                51 G       (1750)
                                     1801 LMK     (2500)         4301 BCOEF   (50)             4351 MSTAR   (1)
                                     4352 NOTJ    (50)           4402 NOTDIM  (1)              4403 LINDEP  (50)
                                     4453 LDDIM   (1)            4454 NOTACT  (50)             4504 NDIM    (1)
       CTAPES         50                0 ITAPES  (50)

STATISTICS
  PROGRAM LENGTH                   143B       99
  CM LABELED COMMON LENGTH       10713B     4555
          52000B CM USED
```

```
      SUBROUTINE DELCON(JM)                                             DELCON   2
C                                                                       DELCON   3
C     THIS ROUTINE UPDATES JSET, NOTJ, AND LMK WHEN A CONSTRAINT        DELCON   4
C     IS DELETED.                                                       DELCON   5
C                                                                       DELCON   6
      COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)     DELCON   7
     1          ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM DELCON   8
      COMMON /CTAPES/ ITAPES                                            DELCON   9
      COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35) DELCON  10
     1                 ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON    DELCON  11
C                                                                       DELCON  12
CIBM                                                                    DELCON  13
C     REAL*8 SUM                                                        DELCON  14
CIBM                                                                    DELCON  15
C                                                                       DELCON  16
      DIMENSION B11(50,50), B1221(50,50)                                DELCON  17
      DIMENSION ITAPES(50)                                              DELCON  18
C                                                                       DELCON  19
      REAL LMK                                                          DELCON  20
C                                                                       DELCON  21
      JMAX = JSET(JM)                                                   DELCON  22
      ITAPEW = ITAPES(6)                                                DELCON  23
      WRITE(ITAPEW,1) JMAX                                              DELCON  24
      DO 9 I= 1,JDIM                                                    DELCON  25
      DO 9 J= 1,JDIM                                                    DELCON  26
    9 B11(I,J)= LMK(I,J)                                                DELCON  27
C                                                                       DELCON  28
C     UPDATE LMK                                                        DELCON  29
C                                                                       DELCON  30
C      FIRST REPLACE ROW AND COLUMN JM WITH ROW AND COLUMN JDIM IN B11  DELCON  31
C                                                                       DELCON  32
      JDIM1 = JDIM-1                                                    DELCON  33
      IF(JDIM1.EQ.0) GO TO 50                                           DELCON  34
      DO 10 I=1,JDIM1                                                   DELCON  35
      DO 10 J=1,JDIM1                                                   DELCON  36
      B11(I,J) = LMK(I,J)                                               DELCON  37
      IF(I.EQ.JM.AND.J.EQ.JM) GO TO 210                                 DELCON  38
      IF(I.NE.JM) GO TO 110                                             DELCON  39
      B11(I,J) = LMK(JDIM,J)                                            DELCON  40
      B11(JDIM,J) = LMK(I,J)                                            DELCON  41
  110 CONTINUE                                                          DELCON  42
      IF(J.NE.JM) GO TO 210                                             DELCON  43
      B11(I,J) = LMK(I,JDIM)                                            DELCON  44
      B11(I,JDIM) = LMK(I,J)                                            DELCON  45
  210 CONTINUE                                                          DELCON  46
      IF(J.NE.JM.OR.I.NE.JM) GO TO 10                                   DELCON  47
      B11(I,J) = LMK(JDIM,JDIM)                                         DELCON  48
      B11(JDIM,JDIM) = LMK(JM,JM)                                       DELCON  49
      B11(JDIM,JM) = LMK(JM,JDIM)                                       DELCON  50
      B11(JM,JDIM) = LMK(JDIM,JM)                                       DELCON  51
   10 CONTINUE                                                          DELCON  52
      DO 400 I=1,JDIM                                                   DELCON  53
  400 CONTINUE                                                          DELCON  54
      DO 20 I=1,JDIM1                                                   DELCON  55
      DO 20 J=1,JDIM1                                                   DELCON  56
CCDC                                                                    DELCON  57
      SUM = 0.0                                                         DELCON  58
```

```
      CCDC                                                              DELCON    59
      CIBM                                                              DELCON    60
      C     SUM = 0.D0                                                  DELCON    61
      CIBM                                                              DELCON    62
            IS = (JDIM-1) * 50 + I                                      DELCON    63
            JS = (J-1) * 50 + JDIM                                      DELCON    64
            B1221(I,J) = SOSCAP(B11,B11,SUM,1,1,50,IS,JS) / B11(JDIM,JDIM)  DELCON    65
      20    CONTINUE                                                    DELCON    66
            DO 30 I=1,JDIM1                                             DELCON    67
            DO 30 J=1,JDIM1                                             DELCON    68
            LMK(I,J) = B11(I,J) - B1221(I,J)                            DELCON    69
      30    CONTINUE                                                    DELCON    70
            WRITE(ITAPEW,2)                                             DELCON    71
            DO 35 I=1,JDIM1                                             DELCON    72
            WRITE(ITAPEW,3) (LMK(I,J),J=1,JDIM1)                        DELCON    73
      35    CONTINUE                                                    DELCON    74
      C                                                                 DELCON    75
      C     UPDATE JSET                                                 DELCON    76
      C                                                                 DELCON    77
            JSET(JM) = JSET(JDIM)                                       DELCON    78
            JSET(JDIM) = 0                                              DELCON    79
            JDIM = JDIM1                                                DELCON    80
            WRITE(ITAPEW,4) (JSET(I),I=1,JDIM)                          DELCON    81
      C                                                                 DELCON    82
      C     UPDATE NOTJ                                                 DELCON    83
      C                                                                 DELCON    84
            IF(JDIM1.NE.0) GO TO 60                                     DELCON    85
      50    CONTINUE                                                    DELCON    86
            JSET(1) = 0                                                 DELCON    87
            JDIM = 0                                                    DELCON    88
      60    CONTINUE                                                    DELCON    89
            NOTDIM = MSTAR - JDIM                                       DELCON    90
            NOTJ(NOTDIM) = JMAX                                         DELCON    91
            WRITE(ITAPEW,5) (NOTJ(I),I=1,NOTDIM)                        DELCON    92
      C                                                                 DELCON    93
          1 FORMAT(1H0,/,10X,27HENTERING DELCON. CONSTRAINT,I4,17H IS TO BE DE DELCON    94
           ALETED)                                                      DELCON    95
          2 FORMAT(1H0,10X,27HINVERSE MOMENT MATRIX,  LMK)              DELCON    96
      3     FORMAT(10X,10(1X,1P1E11.4))                                 DELCON    97
          4 FORMAT(1H0,10X,7HJSET = ,10I5)                              DELCON    98
          5 FORMAT(1H0,10X,7HNOTJ = ,10I5)                              DELCON    99
            RETURN                                                      DELCON   100
            END                                                         DELCON   101
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  DELCON         1             99

VARIABLES       SN   TYPE            RELOCATION
10315  BCOEF         REAL        ARRAY    JGL         REFS       6
  327  B11           REAL        ARRAY                REFS      16      3*64      68    DEFINED     26      36      39
                                                                40        43      44      47        48      49      50
```

```
VARIABLES      SN  TYPE           RELOCATION
  5233  B1221      REAL      ARRAY                  REFS        16        68    DEFINED       64
   257  DELG       REAL      ARRAY      POWELL      REFS         9
   106  DELX       REAL      ARRAY      POWELL      REFS         9
    63  G          REAL      ARRAY      JGL         REFS         6
   214  GRN        REAL      ARRAY      POWELL      REFS         9
   151  GRO        REAL      ARRAY      POWELL      REFS         9
  5207  HGR        REAL      ARRAY      POWELL      REFS         9
  2676  HN         REAL      ARRAY      POWELL      REFS         9
   365  HO         REAL      ARRAY      POWELL      REFS         9
   321  I          INTEGER                          REFS      2*26      2*36       37       38       39       40     2*43
                                                    2*44        46        47       62       64     3*68       72       80
                                                      91   DEFINED        24       34       52       54       66       71
                                                      80        91
  5253  ICON       INTEGER              POWELL      REFS         9
   325  IS         INTEGER                          REFS        64   DEFINED       62
     0  ITAPES     INTEGER   ARRAY      CTAPES      REFS         8        17       22
   320  ITAPEW     INTEGER                       DEFINED        22  I/O REFS       23       70       72       80       91
   322  J          INTEGER                          REFS      2*26      2*36       37     2*39     2*40       42       43
                                                      44        46        47       63       64     3*68       72
                                                 DEFINED        25        35       55       67       72
    62  JDIM       INTEGER              JGL         REFS         6        24       25       32       39       40       43
                                                      44      2*47      2*48     2*49     2*50       52       62       63
                                                    2*64        77        78       80       89  DEFINED       79       87
   323  JDIM1      INTEGER                          REFS        33        34       35       54       55       66       67
                                                      71        72        79       84  DEFINED       32
     0  JM         INTEGER              F.P.        REFS        21      2*37       38       42     2*46     2*48     2*49
                                                    2*50        77   DEFINED        1
   317  JMAX       INTEGER                          REFS        23        90  DEFINED       21
   326  JS         INTEGER                          REFS        64   DEFINED       63
     0  JSET       INTEGER   ARRAY      JGL         REFS         6        21       77       80  DEFINED       77       78
                                                      86
 10545  LDDIM      INTEGER              JGL         REFS         6
 10463  LINDEP     INTEGER   ARRAY      JGL         REFS         6
  3411  LMK        REAL      ARRAY      JGL         REFS         6        19       26       36       39       40       43
                                                      44        47        48       49       50       72
                                                 DEFINED        68
 10377  MSTAR      INTEGER              JGL         REFS         6        89
 10630  NDIM       INTEGER              JGL         REFS         6
 10546  NOTACT     INTEGER   ARRAY      JGL         REFS         6
 10462  NOTDIM     INTEGER              JGL         REFS         6        90       91  DEFINED       89
 10400  NOTJ       INTEGER   ARRAY      JGL         REFS         6        91  DEFINED       90
  5252  NPARM      INTEGER              POWELL      REFS         9
   324  SUM        REAL                             REFS        64   DEFINED       57
    43  XN         REAL      ARRAY      POWELL      REFS         9
     0  XO         REAL      ARRAY      POWELL      REFS         9
   322  Z          REAL      ARRAY      POWELL      REFS         9
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS       REFERENCES
        SOSCAP     REAL       8              64

STATEMENT LABELS              DEF LINE    REFERENCES
   265  1         FMT              93            23
   275  2         FMT              95            70
   302  3         FMT              96            72
   305  4         FMT              97            80
   311  5         FMT              98            91
```

```
STATEMENT LABELS            DEF LINE   REFERENCES
    0   9                      26         24        25
  100   10                     51         34        35        46
    0   20                     65         54        55
    0   30                     69         66        67
    0   35                     73         71
  207   50                     85         33
  211   60                     88         84
   61   110                    41         38
   66   210                    45         37        42
    0   400                    53         52

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   14   9        I         24 26        14B                NOT INNER
   21   9        J         25 26         3B     INSTACK
   33   10       I         34 51        53B                NOT INNER
   51   10       J         35 51        31B       OPT
  110   400      I         52 53         1B     INSTACK
  113   20       I         54 65        23B                EXT REFS  NOT INNER
  114   20       J         55 65        17B                EXT REFS
  137   30       I         66 69        14B                NOT INNER
  144   30       J         67 69         4B     INSTACK
  156   35       I         71 73        20B                EXT REFS  NOT INNER
  161            J         72 72        11B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGL        4505              0 JSET    (50)              50 JDIM    (1)                51 G       (1750)
                                 1801 LMK     (2500)          4301 BCOEF   (50)             4351 MSTAR   (1)
                                 4352 NOTJ    (50)            4402 NOTDIM  (1)              4403 LINDEP  (50)
                                 4453 LDDIM   (1)             4454 NOTACT  (50)             4504 NDIM    (1)
       CTAPES       50              0 ITAPES  (50)
       POWELL     2732              0 XO      (35)              35 XN      (35)               70 DELX    (35)
                                  105 GRO     (35)             140 GRN     (35)              175 DELG    (35)
                                  210 Z       (35)             245 HO      (1225)           1470 HN      (1225)
                                 2695 HGR     (35)            2730 NPARM   (1)              2731 ICON    (1)

STATISTICS
  PROGRAM LENGTH                 12144B     5220
  CM LABELED COMMON LENGTH       16167B     7287
         52000B CM USED
```

```
      SUBROUTINE GRAPRO
C
C     THIS ROUTINE CALCULATES THE GRADIENT PROJECTION.
C
      COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)
     1           ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM
      COMMON /CTAPES/ ITAPES
      COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35)
     1                 ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON
      COMMON /MAX/ MAXDIM
C
CIBM
C     REAL*8 SUM
CIBM
C
      DIMENSION PM(35,35),GGINV(50,50),GGG(35,50),LOC(50)
      DIMENSION ITAPES(50)
C
      ITAPEW = ITAPES(6)
      WRITE(ITAPEW,1)
      DO 10 I=1,JDIM
      DO 10 J=1,JDIM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.DO
CIBM
      J1 = JSET(J)
      I1 = JSET(I)
      IS = (I1-1) * MAXDIM + 1
      JS = (J1-1)*MAXDIM + 1
      GGINV(I,J) = SDSCAP(G,G,SUM,NPARM,1,1,IS,JS)
   10 CONTINUE
      DO 15 I=1,JDIM
      WRITE(ITAPEW,4) (GGINV(I,J),J=1,JDIM)
   15 CONTINUE
      NIX = 0
      CALL SREVNI(GGINV,JDIM,LOC,50,NIX)
      IF(NIX.NE.0) WRITE(ITAPEW,2)
      DO 30 I=1,NPARM
      DO 30 J=1,JDIM
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.DO
CIBM
      DO 20 K=1,JDIM
      K1 = JSET(K)
      SUM = SUM + DBLE(G(I,K1)) * DBLE(GGINV(K,J))
   20 CONTINUE
      GGG(I,J) = SUM
   30 CONTINUE
      DO 40 I=1,NPARM
      DO 40 J=1,NPARM
CCDC
```

```
                SUM = 0.0                                                             GRAPRO      59
          CCDC                                                                        GRAPRO      60
          CIBM                                                                        GRAPRO      61
          C     SUM = 0.DO                                                            GRAPRO      62
          CIBM                                                                        GRAPRO      63
                DO 35 K=1,JDIM                                                        GRAPRO      64
                K1 = JSET(K)                                                          GRAPRO      65
                SUM = SUM + DBLE(GGG(I,K)) * DBLE(G(J,K1))                            GRAPRO      66
          35    CONTINUE                                                              GRAPRO      67
                PM(I,J) = SUM                                                         GRAPRO      68
                IF(I.EQ.J) PM(I,J) = PM(I,J)-1.                                       GRAPRO      69
          40    CONTINUE                                                              GRAPRO      70
                DO 50 I=1,NPARM                                                       GRAPRO      71
          CCDC                                                                        GRAPRO      72
                SUM = 0.0                                                             GRAPRO      73
          CCDC                                                                        GRAPRO      74
          CIBM                                                                        GRAPRO      75
          C     SUM = 0.DO                                                            GRAPRO      76
          CIBM                                                                        GRAPRO      77
                DELX(I) = SOSCAP(PM,GRN,SUM,NPARM,MAXDIM,1,I,1)                       GRAPRO      78
          50    CONTINUE                                                              GRAPRO      79
                WRITE(ITAPEW,3) (DELX(I), I=1,NPARM)                                  GRAPRO      80
              1 FORMAT(1HO,/,10X,15HENTERING GRAPRO)                                  GRAPRO      81
              2 FORMAT(1HO,10X,29HERROR IN SREVNI CALLED GRAPRO)                      GRAPRO      82
              3 FORMAT(1HO,10X,17HDELX TRANSPOSE = ,5(2X,1P1E12.5))                   GRAPRO      83
          4     FORMAT(1HO,9(1X,1P1E11.4))                                            GRAPRO      84
                RETURN                                                                GRAPRO      85
                END                                                                   GRAPRO      86
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    1  GRAPRO         1            84

VARIABLES     SN  TYPE              RELOCATION
10315  BCOEF      REAL        ARRAY    JGL          REFS          5
  257  DELG       REAL        ARRAY    POWELL       REFS          8
  106  DELX       REAL        ARRAY    POWELL       REFS          8         79   DEFINED       77
   63  G          REAL        ARRAY    JGL          REFS          5       2*33        51       65
 7507  GGG        REAL        ARRAY                 REFS         16         65   DEFINED       53
 2603  GGINV      REAL        ARRAY                 REFS         16         36        39       51   DEFINED       33
  214  GRN        REAL        ARRAY    POWELL       REFS          8         77
  151  GRO        REAL        ARRAY    POWELL       REFS          8
 5207  HGR        REAL        ARRAY    POWELL       REFS          8
 2676  HN         REAL        ARRAY    POWELL       REFS          8
  365  HO         REAL        ARRAY    POWELL       REFS          8
  260  I          INTEGER                           REFS         30         33        36       51        53       65       67
                                                    3*68       2*77         79   DEFINED       21        35       41       55
                                                      70         79
 5253  ICON       INTEGER              POWELL       REFS          8
  265  IS         INTEGER                           REFS         33    DEFINED        31
    0  ITAPES     INTEGER     ARRAY    CTAPES       REFS          7         17        19
  257  ITAPEW     INTEGER                        DEFINED         19   I/O REFS        20       36        40       79
```

```
VARIABLES      SN  TYPE            RELOCATION
  264  I1          INTEGER                          REFS       31   DEFINED      30
  261  J           INTEGER                          REFS       29        33      36      51      53      65      67
                                                     3*68   DEFINED      22      36      42      56
   62  JDIM        INTEGER               JGL        REFS        5        21      22      35      36      39      42
                                                       49      63
  266  JS          INTEGER                          REFS       33   DEFINED      32
    0  JSET        INTEGER     ARRAY     JGL        REFS        5        29      30      50      64
  263  J1          INTEGER                          REFS       32   DEFINED      29
  270  K           INTEGER                          REFS       50        51      64      65   DEFINED    49      63
  271  K1          INTEGER                          REFS       51        65   DEFINED      50      64
10545  LDDIM       INTEGER               JGL        REFS        5
10463  LINDEP      INTEGER     ARRAY     JGL        REFS        5
 3411  LMK         INTEGER     ARRAY     JGL        REFS        5
13035  LOC         INTEGER     ARRAY                REFS       16        39
    0  MAXDIM      INTEGER               MAX        REFS       10        31      32      77
10377  MSTAR       INTEGER               JGL        REFS        5
10630  NDIM        INTEGER               JGL        REFS        5
  267  NIX         INTEGER                          REFS       39        40   DEFINED      38
10546  NOTACT      INTEGER     ARRAY     JGL        REFS        5
10462  NOTDIM      INTEGER               JGL        REFS        5
10400  NOTJ        INTEGER     ARRAY     JGL        REFS        5
 5252  NPARM       INTEGER               POWELL     REFS        8        33      41      55      56      70      77
                                                       79
  272  PM          REAL        ARRAY                REFS       16        68      77   DEFINED    67      68
  262  SUM         REAL                             REFS       33        51      53      65      67      77
                                                 DEFINED       24        44      51      58      65      72
   43  XN          REAL        ARRAY     POWELL     REFS        8
    0  XO          REAL        ARRAY     POWELL     REFS        8
  322  Z           REAL        ARRAY     POWELL     REFS        8
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       SOSCAP      REAL      8              33       77
       SREVNI                5              39

INLINE FUNCTIONS   TYPE    ARGS          DEF LINE   REFERENCES
       DBLE        DOUBLE    1   INTRIN                2*51      2*65

STATEMENT LABELS               DEF LINE   REFERENCES
  232  1         FMT                80         20
  236  2         FMT                81         40
  243  3         FMT                82         79
  251  4         FMT                83         36
    0  10                           34         21       22
    0  15                           37         35
    0  20                           52         49
    0  30                           54         41       42
    0  35                           66         63
    0  40                           69         55       56
    0  50                           78         70

LOOPS  LABEL     INDEX     FROM-TO     LENGTH    PROPERTIES
    6  10        I          21  34       22B              EXT REFS  NOT INNER
    7  10        J          22  34       17B              EXT REFS
   31  15        I          35  37       20B              EXT REFS  NOT INNER
   34            J          36  36       11B              EXT REFS
   57  30        I          41  54       31B              NOT INNER
```

```
LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   60  30       J           42 54       25B               NOT INNER
   66  20       K           49 52       11B          OPT
  111  40       I           55 69       33B               NOT INNER
  112  40       J           56 69       30B               NOT INNER
  120  35       K           63 66       11B          OPT
  145  50       I           70 78        7B               EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       JGL        4505                0 JSET    (50)              50 JDIM    (1)               51 G        (1750)
                                   1801 LMK     (2500)          4301 BCOEF   (50)            4351 MSTAR    (1)
                                   4352 NOTJ    (50)            4402 NOTDIM  (1)             4403 LINDEP   (50)
                                   4453 LDDIM   (1)             4454 NOTACT  (50)            4504 NDIM     (1)
       CTAPES       50                0 ITAPES  (50)
       POWELL     2732                0 XO      (35)              35 XN      (35)              70 DELX     (35)
                                    105 GRO     (35)             140 GRN     (35)             175 DELG     (35)
                                    210 Z       (35)             245 HO      (1225)          1470 HN       (1225)
                                   2695 HGR     (35)            2730 NPARM   (1)             2731 ICON     (1)
       MAX           1                0 MAXDIM  (1)

STATISTICS
  PROGRAM LENGTH               13117B     5711
  CM LABELED COMMON LENGTH     16170B     7288
       52000B CM USED
```

```
              SUBROUTINE INSECT(STEP)                                           INSECT   2
        C                                                                       INSECT   3
        C     THIS ROUTINE COMPUTES THE DISTANCE ALONG THE CALCULATED DIRECTION INSECT   4
        C     TO THE NEAREST CONSTRAINT NOT IN SET JSET.  THIS CONSTRAINT IS    INSECT   5
        C     CONSIDERED JNEW AND THE MULTIPLICATION FACTOR ON THE STEP IS STEPS INSECT   6
        C                                                                       INSECT   7
              COMMON /JGL/      JSET(50),JDIM,G(35,50),LMK(50,50),BCOEF(50)     INSECT   8
             1        ,MSTAR,NOTJ(50),NOTDIM,LINDEP(50),LDDIM,NOTACT(50),NDIM   INSECT   9
              COMMON /POWELL/   XO(35),XN(35),DELX(35),GRO(35),GRN(35),DELG(35) INSECT  10
             1                  ,Z(35),HO(35,35),HN(35,35),HGR(35),NPARM,ICON   INSECT  11
              COMMON /MAX/ MAXDIM                                               INSECT  12
              COMMON /NEWCON/   JNEW(50),NEWDIM                                 INSECT  13
        C                                                                       INSECT  14
        CIBM                                                                    INSECT  15
        C     REAL*8 SUM                                                        INSECT  16
        CIBM                                                                    INSECT  17
        C                                                                       INSECT  18
              DIMENSION GTX(50),GTP(50),IPERM(50),ALPHA(50)                     INSECT  19
              WRITE(6,1)                                                        INSECT  20
              CALL NRM2(DELX,PNORM,NPARM)                                       INSECT  21
              VALU = .33/PNORM                                                  INSECT  22
              IF(NDIM.NE.0) GO TO 101                                           INSECT  23
              NEWDIM = 0                                                        INSECT  24
              STEP = AMIN1(VALU,1.)                                             INSECT  25
              RETURN                                                            INSECT  26
        101   CONTINUE                                                          INSECT  27
              WRITE(6,6) (NOTACT(I), I=1,NDIM)                                  INSECT  28
        C      WRITE(7,6) (NOTACT(I),I=1,NDIM)                                  INSECT  29
              IND = 0                                                           INSECT  30
            6 FORMAT(10X,9HNOTACT = ,10I5)                                      INSECT  31
              DO 10 J=1,NDIM                                                    INSECT  32
        CCDC                                                                    INSECT  33
              SUM = 0.0                                                         INSECT  34
        CCDC                                                                    INSECT  35
        CIBM                                                                    INSECT  36
        C     SUM = 0.D0                                                        INSECT  37
        CIBM                                                                    INSECT  38
              N1 = NOTACT(J)                                                    INSECT  39
              IF(N1.EQ.0) GO TO 10                                              INSECT  40
              JS = (N1-1) * MAXDIM + 1                                          INSECT  41
              IND = IND + 1                                                     INSECT  42
              GTX(IND) = SOSCAP(G,XN,SUM,NPARM,1,1,JS,1)                        INSECT  43
        CCDC                                                                    INSECT  44
              SUM = 0.0                                                         INSECT  45
        CCDC                                                                    INSECT  46
        CIBM                                                                    INSECT  47
        C     SUM = 0.D0                                                        INSECT  48
        CIBM                                                                    INSECT  49
              GTP(IND) = SOSCAP(G,DELX,SUM,NPARM,1,1,JS,1)                      INSECT  50
        10    CONTINUE                                                          INSECT  51
        C                                                                       INSECT  52
        C     TEST TO SEE IF GTP(J) = 0.  THIS CAN HAPPEN IF MOTION IS          INSECT  53
        C     PARALLEL TO CONSTRAINT JSET(J).  IF THIS THE CASE, SET ALPHA(J) = INSECT  54
        C     1.0E+10 FOR THIS CONSTRAINT.                                      INSECT  55
        C                                                                       INSECT  56
              DO 20 J=1,NDIM                                                    INSECT  57
              N1 = NOTACT(J)                                                    INSECT  58
```

```
            VAL = ABS(GTP(J))                                                     INSECT      59
            IF(VAL.GT..00001) GO TO 15                                            INSECT      60
            ALPHA(J) = 1.0E+10                                                    INSECT      61
            GO TO 20                                                              INSECT      62
   15       CONTINUE                                                              INSECT      63
            ALPHA(J) = (BCOEF(N1) - GTX(J)) / GTP(J)                              INSECT      64
   20       CONTINUE                                                              INSECT      65
   C         WRITE(7,9) (ALPHA(J),J=1,9)                                          INSECT      66
   C         IF(NDIM.GT.9) WRITE(7,9) (ALPHA(J),J=10,NDIM)                        INSECT      67
          9 FORMAT(9H ALPHA = ,9(1P1E11.4,1X))                                    INSECT      68
            NCON = 1                                                              INSECT      69
            CALL AORDER(ALPHA,NDIM,IPERM,NCON)                                    INSECT      70
   C                                                                              INSECT      71
   C        FIND SMALLEST POSITIVE ALPHA                                          INSECT      72
   C                                                                              INSECT      73
            I=0                                                                   INSECT      74
   30       CONTINUE                                                              INSECT      75
            IF(I.NE.NDIM) GO TO 31                                                INSECT      76
   C                                                                              INSECT      77
   C         THERE ARE NO POSITIVE ALPHAS                                         INSECT      78
   C                                                                              INSECT      79
            STEP = AMIN1(VALU,1.)                                                 INSECT      80
            NEWDIM = 0                                                            INSECT      81
            RETURN                                                                INSECT      82
   31        CONTINUE                                                             INSECT      83
            I=I+1                                                                 INSECT      84
            JP = IPERM(I)                                                         INSECT      85
            STEPS = ALPHA(JP)                                                     INSECT      86
            IF(STEPS.LE.1.0E-04) GO TO 30                                         INSECT      87
            JNEW(1) = NOTACT(JP)                                                  INSECT      88
            STEPSS = AMIN1(1.0,STEPS)                                             INSECT      89
            STEP = AMIN1(STEPSS,VALU)                                             INSECT      90
            WRITE(6,2) JNEW(1),STEPSS,STEPS,VALU,STEP                             INSECT      91
            IF(STEP.EQ.STEPS) GO TO 40                                            INSECT      92
            NEWDIM = 0                                                            INSECT      93
            RETURN                                                                INSECT      94
   40       CONTINUE                                                              INSECT      95
   C                                                                              INSECT      96
   C        CHECK TO SEE IF STEP BRINGS US TO MORE THAN ONE CONSTRAINT.           INSECT      97
   C                                                                              INSECT      98
            NEWDIM = 1                                                            INSECT      99
            JP1 = JP + 1                                                          INSECT     100
            IF(JP1.GT.NDIM) GO TO 60                                              INSECT     101
            DO 50 I=JP1,NDIM                                                      INSECT     102
            DIF = ABS(STEP - ALPHA(I))                                            INSECT     103
            IF(DIF.GT.1.0E-04) GO TO 50                                           INSECT     104
            NEWDIM = NEWDIM + 1                                                   INSECT     105
            JNEW(NEWDIM) = NOTACT(I)                                              INSECT     106
   50       CONTINUE                                                              INSECT     107
   60       CONTINUE                                                              INSECT     108
          1 FORMAT(1H0,/,10X,15HENTERING INSECT)                                  INSECT     109
          2 FORMAT(1H0,1X,10HJNEW(1) = ,I4,1X,9HSTEPSS = ,1P1E11.4,1X,            INSECT     110
           1 8HSTEPS = ,1P1E11.4,1X,7HVALU = ,1P1E11.4,1X,7HSTEP = ,1P1E11.4)     INSECT     111
            RETURN                                                                INSECT     112
            END                                                                   INSECT     113
```

```
          SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  INSECT          1           25        81        93       111

 VARIABLES       SN   TYPE            RELOCATION
    522  ALPHA        REAL        ARRAY               REFS        18        69        85       102   DEFINED        60        63
  10315  BCOEF        REAL        ARRAY    JGL        REFS         7        63
    257  DELG         REAL        ARRAY    POWELL     REFS         9
    106  DELX         REAL        ARRAY    POWELL     REFS         9        20        49
    273  DIF          REAL                            REFS       103   DEFINED       102
     63  G            REAL        ARRAY    JGL        REFS         7        42        49
    214  GRN          REAL        ARRAY    POWELL     REFS         9
    151  GRO          REAL        ARRAY    POWELL     REFS         9
    356  GTP          REAL        ARRAY               REFS        18        58        63   DEFINED        49
    274  GTX          REAL        ARRAY               REFS        18        63   DEFINED        42
   5207  HGR          REAL        ARRAY    POWELL     REFS         9
   2676  HN           REAL        ARRAY    POWELL     REFS         9
    365  HO           REAL        ARRAY    POWELL     REFS         9
    257  I            INTEGER                         REFS        27        75        83        84       102       105
                                                   DEFINED        27        73        83       101
   5253  ICON         INTEGER              POWELL     REFS         9
    260  IND          INTEGER                         REFS        41        42        49   DEFINED        29        41
    440  IPERM        INTEGER     ARRAY               REFS        18        69        84
    261  J            INTEGER                         REFS        38        57        58        60      3*63
                                                   DEFINED        31        56
     62  JDIM         INTEGER              JGL        REFS         7
      0  JNEW         INTEGER     ARRAY    NEWCON     REFS        12        90   DEFINED        87       105
    267  JP           INTEGER                         REFS        85        87        99   DEFINED        84
    272  JP1          INTEGER                         REFS       100       101   DEFINED        99
    264  JS           INTEGER                         REFS        42        49   DEFINED        40
      0  JSET         INTEGER     ARRAY    JGL        REFS         7
  10545  LDDIM        INTEGER              JGL        REFS         7
  10463  LINDEP       INTEGER     ARRAY    JGL        REFS         7
   3411  LMK          INTEGER     ARRAY    JGL        REFS         7
      0  MAXDIM       INTEGER              MAX        REFS        11        40
  10377  MSTAR        INTEGER              JGL        REFS         7
    266  NCON         INTEGER                         REFS        69   DEFINED        68
  1063?  NDIM         INTEGER              JGL        REFS         7        22        27        31        56        69        75
                                                       100       101
     62  NEWDIM       INTEGER              NEWCON     REFS        12       104       105   DEFINED        23        80        92
                                                        98       104
  10546  NOTACT       INTEGER     ARRAY    JGL        REFS         7        27        38        57        87       105
  10462  NOTDIM       INTEGER              JGL        REFS         7
  10400  NOTJ         INTEGER     ARRAY    JGL        REFS         7
   5252  NPARM        INTEGER              POWELL     REFS         9        20        42        49
    263  N1           INTEGER                         REFS        39        40        63   DEFINED        38        57
    255  PNORM        REAL                            REFS        20        21
      0  STEP         REAL                 F.P.       REFS        90        91       102   DEFINED         1        24        79
                                                        89
    270  STEPS        REAL                            REFS        86        88        90        91   DEFINED        85
    271  STEPSS       REAL                            REFS        89        90   DEFINED        88
    262  SUM          REAL                            REFS        42        49   DEFINED        33        44
    265  VAL          REAL                            REFS        59   DEFINED        58
    256  VALU         REAL                            REFS        24        79        89        90   DEFINED        21
     43  XN           REAL        ARRAY    POWELL     REFS         9        42
```

```
            KREAD = KREAD + ( N - KRED - 1)                            SOQUAS    515
            DO 297 LREAD=1,KREAD                                       SOQUAS    516
        297 READ(LTAPE)                                                SOQUAS    517
            DO 299 NROW = 1,ND                                         SOQUAS    518
            READ(MT) ICNT,(A(I),I=1,ICNT)                              SOQUAS    519
        299 WRITE(LTAPE)ICNT,(A(I),I=1,ICNT)                           SOQUAS    520
      C                                                                SOQUAS    521
      C   ***   REWIND ALL FILES EXCEPT THE OUTPUT FILE   NW           SOQUAS    522
      C                                                                SOQUAS    523
            REWIND NI                                                  SOQUAS    524
            REWIND MM                                                  SOQUAS    525
            REWIND NO                                                  SOQUAS    526
            REWIND NAT                                                 SOQUAS    527
            IF( RHSTAP .NE. 0 ) REWIND RHSTAP                          SOQUAS    528
            MD = MTOTAL                                                SOQUAS    529
       9999 CONTINUE                                                   SOQUAS    530
            RETURN                                                     SOQUAS    531
            END                                                        SOQUAS    532
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  SOQUAS         1          37        530

VARIABLES      SN  TYPE            RELOCATION
 1675  A           REAL       ARRAY               REFS        14      2*97     3*101      108      119     2*137    3*140
                                                   148       149     2*222      223     2*246      247      268      288
                                                   313     2*340     2*352    2*353      363      372     2*422      426
                                                 2*433       437       495      519    DEFINED       75       97      101
                                                   128       137       140      189      212      223      236      247
                                                   288       308       313      340      353      363      407      409
                                                   426       437       480      518
 1603  B           REAL                           REFS      2*61     2*259   DEFINED       59      257
 1604  C           REAL                           REFS        61       259   DEFINED       60      258
 1634  I           INTEGER                        REFS       189       212      220      284      518      519
                                               DEFINED       189       206      232      283      298      510      518
                                                   519
 1607  IB          INTEGER                        REFS        90        93      107      119      128      344      345
                                                   348       349       401      431    DEFINED       72       89      106
                                                   119       128       134      343      399      471
 1674  ICNT        INTEGER                        REFS       518     2*519   DEFINED      518
 1655  IDUMMY      INTEGER                     DEFINED       299       308
 1631  IINIT       INTEGER                        REFS       263       264      265    DEFINED      185
 1650  INITP1      INTEGER                        REFS       266   DEFINED      264
 1611  IO          INTEGER                        REFS        75       350      351      372      407      409    2*433
                                               DEFINED        75        93      116      127      349      372      407
                                                   409       421     2*433      479      492
 1625  J           INTEGER                        REFS       148       268      308    DEFINED      148      188      268
                                                   285       308
 1637  JCNT        INTEGER                        REFS       217       219      241      243    DEFINED      213      2 /
                                                   237       241       304
 1562  JPASS1      LOGICAL                        REFS        18       404      410      444      497
                                               DEFINED       271       448
```

```
      NOUT = NT
C
C - - LOOP BACK THRU THE SOLUTION
C
      NL = NF
      GO TO 119
C
C - - START TO WRAP IT UP
C
  200 REWIND NIN
      N2 = N
C
C * * NOTE . AT THIS POINT ALL LOCATIONS A(1) THRU A(KORE) ARE FREE
C
      DO 220 IB = 1, NPASS
      READ (NIN) K
      N1 = N2 - K + 1
      NS = N1
      NT = N2
C
C - - READ IN THE SOLUTIONS
C
      DO 210 IO = 1, M
      READ (NIN) (A(NN), NN = NS, NT)
      NT = NT + N
  210 NS = NS + N
  220 N2 = N1 - 1
C
C  ---  REWIND ALL INPUT TAPES
      REWIND NIN
      REWIND MT
      REWIND NOUT
C - - WRITE THE SOLUTIONS ON TAPE
C
      NT = 0
      DO 230 IO = 1, M
      NS = NT + 1
      NT = NT + N
  230 WRITE (NW) (A(NN), NN = NS, NT)
C   ***   IF TAPE WAS NEVER SWITCHED IT WOULD BE FOOLISH TO SWITCH BACK
      IF(JPASS1)GO TO 290
C
C***   ***SWITCH TAPES
C*** ***BACK SO THAT  MT WILL CONAIN THE TRAPEZOIDAL MATRIX
C*** ***NATAPE WILL HAVE NOTHING USEFUL ON IT.
      NTEMP = NATAPE
      NATAPE = MT
      MT = NTEMP
      REWIND NATAPE
  290 IF( .NOT. LASTRS)GO TO 109
  295 REWIND LTAPE
      REWIND MT
      KRED = 0
      DO 297 I=1,NLCNT
      READ(LTAPE)KREAD
  304 CONTINUE
      KRED = KRED + KREAD
```

```
      NT = NT - 1                                                       SOQUAS 401
      IF (IB .LE. NROW) GO TO 160                                       SOQUAS 402
      NS = NS + NN                                                      SOQUAS 403
      NT = NT + NN                                                      SOQUAS 404
  160 IF (.NOT. JPASS1)GO TO 161                                        SOQUAS 405
      NBEG = NT - M + 1                                                 SOQUAS 406
C*** ***READ RHS FROM NATAPE                                             SOQUAS 407
      READ (NATAPE) ( A(IO),IO = NBEG,NT)                               SOQUAS 408
      NT = NT - M                                                       SOQUAS 409
  161 READ(MT)NN,(A(IO),IO=NS,NT)                                       SOQUAS 410
      IF( .NOT. JPASS1 ) GO TO 163                                      SOQUAS 411
      NT = NT + M                                                       SOQUAS 412
      NN = NN + M                                                       SOQUAS 413
  163 NP = N1 - 1                                                       SOQUAS 414
      NF = NT - M - KM1                                                 SOQUAS 415
      NN = NN - KOLD                                                    SOQUAS 416
      DO 170 MN = 1, M                                                  SOQUAS 417
      N2 = NF                                                           SOQUAS 418
      NA = NP + MN                                                      SOQUAS 419
      NB = NA                                                           SOQUAS 420
      SUM = 0.0                                                         SOQUAS 421
      DO 165 IO = 1, KOLD                                               SOQUAS 422
      SUM = SUM + A(N2) * A(NA)                                         SOQUAS 423
      N2 = N2 + 1                                                       SOQUAS 424
  165 NA = NA + M                                                       SOQUAS 425
      N2 = N2 + MN - 1                                                  SOQUAS 426
  170 A(N2) = A(N2) - SUM                                               SOQUAS 427
C                                                                       SOQUAS 428
C - - WRITE THE MODIFIED ROW ON TAPE OR CONDENSE THE ROW                 SOQUAS 429
C                                                                       SOQUAS 430
      NL = NT - M + 1                                                   SOQUAS 431
      IF (IB .GE. NROW) GO TO 175                                       SOQUAS 432
      NF = NL - KP1                                                     SOQUAS 433
      WRITE (NOUT) NN, (A(IO), IO = NS, NF), (A(IO), IO = NL, NT)       SOQUAS 434
      GO TO 190                                                         SOQUAS 435
  175 NF = NL - KOLD                                                    SOQUAS 436
      DO 180 MN = NL, NT                                                SOQUAS 437
      A(NF) = A(MN)                                                     SOQUAS 438
  180 NF = NF + 1                                                       SOQUAS 439
  190 CONTINUE                                                          SOQUAS 440
C*** ***IF 1ST TIME THRU BACK SOLN,SWITCH TAPES SO THAT MT WHICH HAS THE SOQUAS 441
C*** ***ORIGINAL TRAPEZOIDAL MATRIX ON IT BECOME NATAPE AND IS NOT TO   SOQUAS 442
C*** ***TAPE PART IN ALTERNATING SHRINKING MATRICES.  NATAPE BECOMES MT SOQUAS 443
C*** ***AND THIS NOW DOES THE ALTERNATING WITH NOUT.                    SOQUAS 444
      IF( .NOT. JPASS1 ) GO TO 195                                      SOQUAS 445
      NTEMP = MT                                                        SOQUAS 446
      MT = NATAPE                                                       SOQUAS 447
      NATAPE = NTEMP                                                    SOQUAS 448
      JPASS1= .FALSE.                                                   SOQUAS 449
      REWIND NATAPE                                                     SOQUAS 450
  195 REWIND MT                                                         SOQUAS 451
      REWIND NOUT                                                       SOQUAS 452
C                                                                       SOQUAS 453
C - - SWITCH THE TAPES                                                  SOQUAS 454
C                                                                       SOQUAS 455
      NT = MT                                                           SOQUAS 456
      MT = NOUT                                                         SOQUAS 457
```

```
      DO 125 IB = 1, KM1                                                SOQUAS   344
      NF = NF - IB - M                                                  SOQUAS   345
      NT = NT - MP1 - IB                                                SOQUAS   346
      SUM = 0.0                                                         SOQUAS   347
      NP = NF                                                           SOQUAS   348
      N2 = MP1 + IB                                                     SOQUAS   349
      DO 120 IO = 1, IB                                                 SOQUAS   350
      NN = NT + IO                                                      SOQUAS   351
      NP = NP + N2 - IO                                                 SOQUAS   352
  120 SUM = SUM + A(NN) * A(NP)                                         SOQUAS   353
  125 A(NF) = (A(NF) - SUM) / A(NT)                                     SOQUAS   354
  130 CONTINUE                                                          SOQUAS   355
C                                                                       SOQUAS   356
C - - MOVE THE SOLUTIONS TO CONTIGUOUS LOCATIONS STARTING AT A(N1)      SOQUAS   357
C                                                                       SOQUAS   358
      N1 = KORE + 1                                                     SOQUAS   359
      DO 140 NN = 1, K                                                  SOQUAS   360
      DO 135 MN = 1, M                                                  SOQUAS   361
      NL = NL - 1                                                       SOQUAS   362
      N1 = N1 - 1                                                       SOQUAS   363
  135 A(N1) = A(NL)                                                     SOQUAS   364
  140 NL = NL - NN                                                      SOQUAS   365
C                                                                       SOQUAS   366
C - - WRITE THE SOLUTIONS ON TAPE                                       SOQUAS   367
C                                                                       SOQUAS   368
      WRITE (NIN) K                                                     SOQUAS   369
      NS = N1 - 1                                                       SOQUAS   370
      DO 145 MN = 1, M                                                  SOQUAS   371
      NT = NS + MN                                                      SOQUAS   372
  145 WRITE ( NIN ) (A(IO), IO = NT, KORE, M)                           SOQUAS   373
C                                                                       SOQUAS   374
C - - TEST IF THIS IS THE LAST PASS                                     SOQUAS   375
C                                                                       SOQUAS   376
      IF (LAST) GO TO 200                                               SOQUAS   377
C                                                                       SOQUAS   378
C - - WE MUST NOW MODIFY THE TRIANGULAR MATRIX TO REFLECT THE EFFECT OF SOQUAS   379
C     THE SOLUTIONS OBTAINED SO FAR  (EQ 21)                            SOQUAS   380
C * * NOTE..LOCATIONS A(1) TO A(N1-1) ARE NOW FREE TO USE               SOQUAS   381
C                                                                       SOQUAS   382
C - - CALCULATE THE NEXT VALUES OF 'NEL' AND 'NREM'                     SOQUAS   383
C                                                                       SOQUAS   384
      NELOLD = NEL                                                      SOQUAS   385
      KOLD = K                                                          SOQUAS   386
      NEL = NEL - K                                                     SOQUAS   387
      NREM = NREM - K                                                   SOQUAS   388
C                                                                       SOQUAS   389
      NROW = NREM - K + 1                                               SOQUAS   390
      IF (K .LT. NREM) GO TO 150                                        SOQUAS   391
      LAST = .TRUE.                                                     SOQUAS   392
      NROW = 1                                                          SOQUAS   393
      K = NREM                                                          SOQUAS   394
  150 NS = 1                                                            SOQUAS   395
      NT = NELOLD + 1                                                   SOQUAS   396
C                                                                       SOQUAS   397
C - - READ IN THE ROWS TO BE MODIFIED                                   SOQUAS   398
C                                                                       SOQUAS   399
      DO 190 IB = 1, NREM                                               SOQUAS   400
```

```
      NNEW = NNEW - 1                                                 SOQUAS   287
      NOLD = NOLD - 1                                                 SOQUAS   288
      A(NNEW) = A(NOLD)                                               SOQUAS   289
  118 CONTINUE                                                        SOQUAS   290
 1118 CONTINUE                                                        SOQUAS   291
C                                                                     SOQUAS   292
C***    ***NOW NNEW = KORE - (M*KF) + 1                               SOQUAS   293
C***    ***NOW NOLD = KORE - (M - 1) * N + 1 - KF                     SOQUAS   294
C   ***   SKIP 1ST PART OF TRAPEZOIDAL MATRIX + READ LAST K ROWS      SOQUAS   295
C*** ***ATTATCH RHS TO IT SO THAT EVERYTHING IS IN CONSECUTIVE ORDER  SOQUAS   296
      NREMAN = ND - K                                                 SOQUAS   297
      IF(NREMAN .EQ. O)GO TO 126                                      SOQUAS   298
      DO 122 I = 1,NREMAN                                             SOQUAS   299
  122 READ(MT) IDUMMY                                                 SOQUAS   300
  126 NEND = O                                                        SOQUAS   301
      KCNT = K                                                        SOQUAS   302
      NNEW = NNEW - 1                                                 SOQUAS   303
C***    ***NOTE THAT K = KF WHICH IS ALREADY KNOWN IN CORE            SOQUAS   304
      DO 121 JCNT = 1,K                                               SOQUAS   305
      NBEG = NEND + 1                                                 SOQUAS   306
      KCNT = KCNT - 1                                                 SOQUAS   307
      NEND = NBEG + KCNT                                              SOQUAS   308
      READ(MT)IDUMMY,(A(J),J=NBEG,NEND)                               SOQUAS   309
      NNEW = NNEW + 1                                                 SOQUAS   310
      KEND = (MM1 * KF) + NNEW                                        SOQUAS   311
      DO 121 NPP=NNEW,KEND,KF                                         SOQUAS   312
      NEND = NEND + 1                                                 SOQUAS   313
  121 A(NEND) = A(NPP)                                                SOQUAS   314
      REWIND LTAPE                                                    SOQUAS   315
      REWIND MT                                                       SOQUAS   316
C                                                                     SOQUAS   317
C - - THERE, NOW WE CAN START THE BACK-SOLUTION                       SOQUAS   318
C * * NOTE. THE FIRST AVAILABLE LOCATION FOR THE SOLUTIONS IS A(N1)   SOQUAS   319
C                                                                     SOQUAS   320
C                                                                     SOQUAS   321
C***    ***NL IS THE LAST SUBSCRIPT + 1 OF THE TRAPEZOIDAL A MATRIX THAT SOQUAS 322
C***    ***CORE                                                       SOQUAS   323
C                                                                     SOQUAS   324
      NL = NEND + 1                                                   SOQUAS   325
      NREM = N                                                        SOQUAS   326
      NPM = N + M                                                     SOQUAS   327
      NEL = NPM                                                       SOQUAS   328
      MP1 = M + 1                                                     SOQUAS   329
      LAST = K .EQ. N                                                 SOQUAS   330
      NPASS = O                                                       SOQUAS   331
C                                                                     SOQUAS   332
C - - SOLVE FOR THE ANSWERS CORRESPONDING TO 'K' ROWS                 SOQUAS   333
C                                                                     SOQUAS   334
  119 KM1 = K - 1                                                     SOQUAS   335
      KP1 = K + 1                                                     SOQUAS   336
      NS = NL - MP1                                                   SOQUAS   337
      NPASS = NPASS + 1                                               SOQUAS   338
      DO 130 MN = 1, M                                                SOQUAS   339
      NF = NS + MN                                                    SOQUAS   340
      A(NF) = A(NF) / A(NS)                                           SOQUAS   341
      NT = NS                                                         SOQUAS   342
      IF (KM1 .EQ. O) GO  TO 130                                      SOQUAS   343
```

```
      NTEND = NEND
      KSUMP1 = KSUM + 1
C*** ***READ REST OF LROWS 1 ROW AT A TIME FOR CONSTANT SECTION
      DO 115 I=KSUMP1,N
      NTBEG = NTBEG + 1
      NTEND = NTEND + 1
 1115 CONTINUE
      READ (LTAPE)( A(NN),NN=1,K)
      JCNT = -1
C*** ***PARTIALLY  REDUCE A RHS ACROSS A RHS ROW BY APPLYING K NUMBER
C*** ***OF L(I,J) S
      DO 124 NPP = NTBEG,NTEND,N
      JCNT = JCNT + 1
      SUM = 0.0
      NROW = KINIT + ( JCNT * N )
      DO 123 NN = 1,K
      NROW = NROW + 1
  123 SUM = SUM + ( A(NN) * A(NROW) )
  124 A(NPP) = A(NPP) - SUM
  115 CONTINUE
      NBEG = NBEG + 1
      NEND = NEND + 1
C*** ***KINIT IS HOW FAR DOWN A COLUMN OF RHS TO START MULTIPLYING BY
C*** ***L(I,J) AT EACH PASS THROUGH
      KINIT = KINIT + K
C*** ***IF KSUMP1 = N THERE ARE NO MORE L(I,J)'S LEFT
      IF(KSUMP1 .LT. N)GO TO 111
C*** ***WRITE OUT ALL BUT LAST K ROWS OF RHS IN ROW ORDER ON NATAPE
  116 B = 4*M + 3
      C = -2 * KORE
      K = (  -B  +  SQRT( B**2  -4.0*C )  )/2.0
      IF(K .GT. ND) K = ND
      KF = K
      KM1 = K - 1
      KLEFT = N - KF + IINIT
      INITP1 = IINIT + 1
      NEND = (M-1)*N + IINIT
      DO 117 NPP = INITP1,KLEFT
      NEND = NEND + 1
  117 WRITE(NATAPE) ( A(J),J=NPP,NEND,N)
      REWIND NATAPE
C*** ***JPASS1 IS TRUE ON 1ST PASS THRU BACK SOLUTION
      JPASS1 = .TRUE.
C
C***   ***PUT REMAINING RHS IN CONTIGUOUS LOCATIONS BY COLUMNS
C***  FROM KORE - (M * KF) + 1  TO  KORE
C
      NNEW = KORE - KF + 1
      MM1 = M - 1
C
C***   ***IF M = 1, THE ELTS OF THE 1 RHS COLUMN ARE ALREADY IN CONTIGUO
C***   ***LOCATIONS
C
      IF (M.EQ.1)  GO TO 1118
      DO 118 I = 1,MM1
      NOLD = KORE - (I*N) + 1
      DO 118 J = 1,KF
```

```
      REWIND MT                                                         SOQUAS    173
C*** ***CALCULATE THE NUMBER OF COLUMNS TO BRING OFF OF THE RHS TAPE    SOQUAS    174
      MTOTAL = 0                                                        SOQUAS    175
      M = MMAX                                                          SOQUAS    176
      IF(M .EQ. 0)GO TO 295                                             SOQUAS    177
C*** ***MTOTALIS THE TOTAL NUMBER OF RHS COLUMNS ALREADY BROUGHT IN      SOQUAS    178
  109 MTOTAL = MTOTAL + M                                               SOQUAS    179
      LASTRS = MTOTAL.GE. MRHS                                          SOQUAS    180
      MTOTAL = MTOTAL - M                                               SOQUAS    181
      IF (LASTRS)M = MRHS - MTOTAL                                      SOQUAS    182
      MTOTAL = MTOTAL + M                                               SOQUAS    183
C*** ***BRING IN M COLUMNS OF RHS                                       SOQUAS    184
      KINIT = KORE - (M*N)                                              SOQUAS    185
      IINIT = KINIT                                                     SOQUAS    186
      NBEG = KINIT + 1                                                  SOQUAS    187
      NEND = KINIT+ N                                                   SOQUAS    188
      DO 110 J =1,M                                                     SOQUAS    189
      READ (RHSTAP)( A(I),I=NBEG,NEND)                                  SOQUAS    190
      NBEG = NEND + 1                                                   SOQUAS    191
  110 NEND = NEND + N                                                   SOQUAS    192
C*** ***BRING IN L(I,J) MATRIX AND APPLY IT TO RHS                      SOQUAS    193
      NBEG = 1 + KINIT                                                  SOQUAS    194
      NEND = 1 + (M-1) * N + KINIT                                      SOQUAS    195
      KSUM = 0                                                          SOQUAS    196
C*** ***DO TRIANGULAR SECTION OF LMATRIX                                SOQUAS    197
      NLCNT = 0                                                         SOQUAS    198
  111 READ (LTAPE)K                                                     SOQUAS    199
      NLCNT = NLCNT + 1                                                 SOQUAS    200
C*** ***KSUM IS THE TOTAL NUMBER OF L ROWS THAT WILL                    SOQUAS    201
C*** ***BE READ AFTER THIS TRIANGULAR SECTION IS FINISHED               SOQUAS    202
      KSUM = KSUM + K                                                   SOQUAS    203
      KM1 = K - 1                                                       SOQUAS    204
C***   ***NOTE THAT KM1 CAN'T BE 0 SINCE K CAN'T BE 1 AND STILL HAVE SOM SOQUAS    205
C***   ***ON THE LTAPE                                                  SOQUAS    206
      DO 114  I = 1,KM1                                                 SOQUAS    207
      NBEG = NBEG + 1                                                   SOQUAS    208
      NEND = NEND + 1                                                   SOQUAS    209
C*** ***READ 1 ROW OF L(I,J) FROM LTAPE---K-1 TIMES---EACH TIME         SOQUAS    210
C*** ***STARTING WITH L(1)                                              SOQUAS    211
 1114 CONTINUE                                                          SOQUAS    212
      READ (LTAPE) ( A(NN),NN=1,I)                                      SOQUAS    213
      JCNT = -1                                                         SOQUAS    214
C*** ***REDUCE THE RHS BY GOING ACROSS A SOLUTION ROW (WHICH            SOQUAS    215
C*** ***ARE NOT IN CONSECUTIVE ORDER, BUT A(1), A(N+1), A(2N+1) ETC.)   SOQUAS    216
      DO 113 NPP = NBEG,NEND,N                                          SOQUAS    217
      JCNT = JCNT + 1                                                   SOQUAS    218
      SUM = 0.0                                                         SOQUAS    219
      NROW = KINIT + ( JCNT * N )                                       SOQUAS    220
      DO 112 NN=1,I                                                     SOQUAS    221
      NROW = NROW + 1                                                   SOQUAS    222
  112 SUM = SUM + ( A(NN)*A(NROW))                                      SOQUAS    223
  113 A(NPP) = A(NPP) - SUM                                             SOQUAS    224
  114 CONTINUE                                                          SOQUAS    225
      IF (KSUM .EQ. N)GO TO 116                                         SOQUAS    226
C*** ***KSUM = N IF YOU HAVE READ ENTIRE LMATRIX AND                    SOQUAS    227
C*** ***THERE IS NO CONSTANT SECTION LEFT                               SOQUAS    228
      NTBEG = NBEG                                                      SOQUAS    229
```

```
      NS = - NEL                                                        SOQUAS   116
      DO 60 IO = 1, K                                                   SOQUAS   117
      NS = NS + NELP1                                                   SOQUAS   118
      NT = NT + NEL                                                     SOQUAS   119
      WRITE (MT) NP, (A(IB), IB = NS, NT)                               SOQUAS   120
   60 NP = NP - 1                                                       SOQUAS   121
      IF (LAST) GO TO 90                                                SOQUAS   122
      NP = NP - M                                                       SOQUAS   123
      NS = KORE - NEL + 1                                               SOQUAS   124
C                                                                       SOQUAS   125
C - - READ ANOTHER ROW                                                  SOQUAS   126
C                                                                       SOQUAS   127
      DO 80 IO = 1, NP                                                  SOQUAS   128
      READ (NIN) (A(IB), IB = NS, KORE)                                 SOQUAS   129
C                                                                       SOQUAS   130
C - - MODIFY THIS ROW BY THE 'TRAPEZOIDAL' ARRAY                        SOQUAS   131
C                                                                       SOQUAS   132
      NT = 1                                                            SOQUAS   133
      MN = NS                                                           SOQUAS   134
      DO 70 IB = 1, K                                                   SOQUAS   135
      NB = NT                                                           SOQUAS   136
      NF = MN + 1                                                       SOQUAS   137
      A(MN) = A(MN) / A(NT)                                             SOQUAS   138
      DO 65 NN = NF, KORE                                               SOQUAS   139
      NB = NB + 1                                                       SOQUAS   140
   65 A(NN) = A(NN) - A(MN) * A(NB)                                     SOQUAS   141
      MN = NF                                                           SOQUAS   142
   70 NT = NT + NELP1                                                   SOQUAS   143
C                                                                       SOQUAS   144
C - - WRITE THE MODIFIED ROW ON TAPE                                    SOQUAS   145
C                                                                       SOQUAS   146
C*** ***WRITE REST OF LMATRIX ON LTAPE                                  SOQUAS   147
      MNM1 = MN - 1                                                     SOQUAS   148
      WRITE(LTAPE)(A(J),J=NS,MNM1)                                      SOQUAS   149
   80 WRITE (NOUT)     (A(NT), NT = MN, KORE)                           SOQUAS   150
      REWIND NOUT                                                       SOQUAS   151
      REWIND NIN                                                        SOQUAS   152
C                                                                       SOQUAS   153
C - - SWITCH THE TAPES                                                  SOQUAS   154
C                                                                       SOQUAS   155
      NT = NIN                                                          SOQUAS   156
      NIN = NOUT                                                        SOQUAS   157
      NOUT = NT                                                         SOQUAS   158
C                                                                       SOQUAS   159
C - - RE-CALCULATE ROW LENGTH AND LOOP BACK                             SOQUAS   160
C                                                                       SOQUAS   161
      NEL = NEL - K                                                     SOQUAS   162
      NN = NEL - M                                                      SOQUAS   163
      GO TO 10                                                          SOQUAS   164
C                                                                       SOQUAS   165
C - - REWIND ALL TAPES                                                  SOQUAS   166
C                                                                       SOQUAS   167
   90 REWIND NIN                                                        SOQUAS   168
      REWIND NOUT                                                       SOQUAS   169
C                                                                       SOQUAS   170
  105 N1 = KORE - K * M + 1                                             SOQUAS   171
      REWIND LTAPE                                                      SOQUAS   172
```

```
          K = NN                                                       SOQUAS     59
          B = 3 + MMAX*2                                               SOQUAS     60
          C = 2 * (1 + MMAX - KORE )                                   SOQUAS     61
          KTEMP = ( -B + SQRT(B**2  - 4.0* C )  )  / 2.0               SOQUAS     62
          IF(KTEMP .GE. K)GO TO 30                                     SOQUAS     63
C                                                                      SOQUAS     64
C***    *  WE MUST REDUCE THE FINAL K                                  SOQUAS     65
C                                                                      SOQUAS     66
          K = KTEMP                                                    SOQUAS     67
          LAST = .FALSE.                                               SOQUAS     68
C                                                                      SOQUAS     69
C - - READ 'K' ROWS OF THE AUGMENTED 'A' MATRIX                        SOQUAS     70
C                                                                      SOQUAS     71
       30 NT = 0                                                       SOQUAS     72
          DO 40 IB = 1, K                                              SOQUAS     73
          NS = NT + 1                                                  SOQUAS     74
          NT = NT + NEL                                                SOQUAS     75
       40 READ (NIN) (A(IO), IO = NS, NT)                              SOQUAS     76
C                                                                      SOQUAS     77
C - - CHECK TO SEE IF WE WERE UNLUCKY ENOUGH TO END UP WITH ONLY ONE ROW SOQUAS    78
C                                                                      SOQUAS     79
          IF (K .EQ. 1) GO TO 90                                       SOQUAS     80
C                                                                      SOQUAS     81
C - - 'K' IS GREATER THAN '1' SO WE CAN START THE TRIANGULARIZATION    SOQUAS     82
C                                                                      SOQUAS     83
          NELP1 = NEL + 1                                              SOQUAS     84
          NS = - NEL                                                   SOQUAS     85
          NELP2 = NELP1 + 1                                            SOQUAS     86
C                                                                      SOQUAS     87
C - - FORM THE 'TRAPEZOIDAL' ARRAY  (8)                                SOQUAS     88
C                                                                      SOQUAS     89
          DO 50 IB = 2, K                                              SOQUAS     90
          NP = NELP2 - IB                                              SOQUAS     91
          NS = NS + NELP1                                              SOQUAS     92
          NT = NS                                                      SOQUAS     93
          DO 50 IO = IB, K                                             SOQUAS     94
          NT = NT + NEL                                                SOQUAS     95
          MN = NT                                                      SOQUAS     96
          NB = NS                                                      SOQUAS     97
          A(NT) = A(NT) / A(NS)                                        SOQUAS     98
          DO 50 NF = 2, NP                                             SOQUAS     99
          MN = MN + 1                                                  SOQUAS    100
          NB = NB + 1                                                  SOQUAS    101
       50 A(MN) = A(MN) - A(NT) * A(NB)                                SOQUAS    102
C*** ***WRITE PART OF THE LMATRIX ON LTAPE   (TRIANGULAR PART)         SOQUAS    103
          WRITE (LTAPE)K                                               SOQUAS    104
          LBEG =NELP1                                                  SOQUAS    105
          KM1 = K - 1                                                  SOQUAS    106
          DO 55 IB = 1,KM1                                             SOQUAS    107
          LEND = LBEG + IB- 1                                          SOQUAS    108
          WRITE (LTAPE) ( A(L),L=LBEG,LEND)                            SOQUAS    109
       55 LBEG = LBEG + NN                                             SOQUAS    110
C                                                                      SOQUAS    111
C - - WRITE THE 'TRAPEZOIDAL' MATRIX ON TAPE                           SOQUAS    112
C                                                                      SOQUAS    113
          NT = 0                                                       SOQUAS    114
          NP = NEL                                                     SOQUAS    115
```

```
      SUBROUTINE SOQUAS (ND,MD,KD,NI,MM,NO,NAT,NW,LTAPE,RHSTAP)         SOQUAS   2
C  ***   REAL   SOLVIT     QUASI INVERSE                                SOQUAS   3
C                                                                       SOQUAS   4
C           ****   ***/  *******  *****  *       ***/        *          SOQUAS   5
C           *   *  * /*     *       *    *      * /*       ******       SOQUAS   6
C     ****  ****   * / *    *      ***   *      * / *  ****    *  *     SOQUAS   7
C           *      */  *    *       *    *      */  *         ***       SOQUAS   8
C           *      /***     *       *    *****  /***          *  *      SOQUAS   9
C                                                                       SOQUAS  10
C             D I R E C T   M A T R I X   S O L U T I O N               SOQUAS  11
C                                                                       SOQUAS  12
C*** ***LTAPE IS THE TAPE THE L(I,J) MATRIX WILL BE PUT ON              SOQUAS  13
C*** ***RHSTAP IS THE TAPE THAT THE RIGHT HAND SIDES ARE INPUT ON       SOQUAS  14
      DIMENSION  A(4000)                                                SOQUAS  15
      INTEGER RHSTAP                                                    SOQUAS  16
C                                                                       SOQUAS  17
C                                                                       SOQUAS  18
      LOGICAL JPASS1                                                    SOQUAS  19
      LOGICAL  LASTRS                                                   SOQUAS  20
      LOGICAL  LAST                                                     SOQUAS  21
C                                                                       SOQUAS  22
    1 CONTINUE                                                          SOQUAS  23
      NATAPE = NAT                                                      SOQUAS  24
      REWIND NATAPE                                                     SOQUAS  25
      REWIND NW                                                         SOQUAS  26
      N = ND                                                            SOQUAS  27
      KORE = KD                                                         SOQUAS  28
C*** *  RHSTAP = O IF THERE ARE NO RHS TO BE PROCESSED THIS RUN         SOQUAS  29
      IF(RHSTAP .NE. O )GO TO 5                                         SOQUAS  30
      MRHS = O                                                          SOQUAS  31
      GO TO 6                                                           SOQUAS  32
    5 REWIND RHSTAP                                                     SOQUAS  33
      READ(RHSTAP)MRHS                                                  SOQUAS  34
    6 M = KORE / N  -  1                                                SOQUAS  35
      MMAX = MINO(MRHS,M)                                               SOQUAS  36
      NPM = N + MMAX                                                    SOQUAS  37
      IF (MAXO(3 * NPM, M * N) .GT. KORE) RETURN                        SOQUAS  38
      M = O                                                             SOQUAS  39
      NPM = N                                                           SOQUAS  40
      MT = MM                                                           SOQUAS  41
      REWIND MT                                                         SOQUAS  42
      NIN = NI                                                          SOQUAS  43
      REWIND NIN                                                        SOQUAS  44
      NOUT = NO                                                         SOQUAS  45
      REWIND NOUT                                                       SOQUAS  46
      MP1 = M + 1                                                       SOQUAS  47
      NN = N                                                            SOQUAS  48
      NEL = NPM                                                         SOQUAS  49
C                                                                       SOQUAS  50
C - - CALCULATE THE MAXIMUM NO. OF ROWS, 'K'                            SOQUAS  51
C                                                                       SOQUAS  52
   10 K = (KORE - NEL) / NEL                                            SOQUAS  53
C                                                                       SOQUAS  54
C - - TEST TO SEE IF THE REST OF THE MATRIX WILL FIT IN CORE            SOQUAS  55
C                                                                       SOQUAS  56
      LAST = K .GE. NN                                                  SOQUAS  57
      IF( .NOT  LAST ) GO TO 30                                         SOQUAS  58
```

```
LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   14  5        I           16 19        15B              EXT REFS
   51  20       I           28 34        20B              EXT REFS  NOT INNER
   54  10       J           29 32         4B     INSTACK

STATISTICS
  PROGRAM LENGTH                 300B       192
          52000B CM USED
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    42     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.



         SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  INV               1         49         55

 VARIABLES      SN  TYPE            RELOCATION
     0  BUF         REAL       ARRAY     F.P.        REFS          3         52    DEFINED          1
   261  I           INTEGER                          REFS         31    DEFINED         16         28
     0  INPUT       INTEGER              F.P.     DEFINED          1    I/O REFS        17
     0  ISIZE       INTEGER              F.P.        REFS         52    DEFINED          1
   264  IWHICH      INTEGER                          REFS         42    DEFINED         36         39          45
   263  J           INTEGER                          REFS         30       2*31    DEFINED         29
   262  K           INTEGER                          REFS         17         18         33    DEFINED          17         18         33
   256  KD          INTEGER                          REFS         37         44    DEFINED         12
     0  KEY         INTEGER              F.P.        REFS         49    DEFINED          1
     0  LTAPE       INTEGER              F.P.        REFS         37         44         52    DEFINED          1
                                                  I/O REFS        26         50         53
   260  M           INTEGER                          REFS         37         38         39         44          45
                                                  DEFINED         14
     0  NBOX        INTEGER              F.P.        REFS         13         16         17         18        2*27         28         29
                                                       33         39         45       2*52    DEFINED          1
   257  ND          INTEGER                          REFS         37         44    DEFINED         13
     0  NTP1        INTEGER              F.P.        REFS         37         44    DEFINED          1    I/O REFS         15         18
                                                       20
     0  NTP2        INTEGER              F.P.        REFS         37         44    DEFINED          1    I/O REFS         21
     0  NTP3        INTEGER              F.P.        REFS         37         44         52    DEFINED          1
                                                  I/O REFS        22         41         48         54
     0  NTP4        INTEGER              F.P.        REFS         37         44    DEFINED          1    I/O REFS         23         27
                                                       33         35
     0  NTP8        INTEGER              F.P.        REFS         37         44         52    DEFINED          1
                                                  I/O REFS        24         51
     0  NTP9        INTEGER              F.P.        REFS         37         44    DEFINED          1    I/O REFS         25
     0  VEC         REAL       ARRAY     F.P.        REFS          3         18         33         52    DEFINED          1         17
                                                       30         31
        VARIABL'  USED AS FILE NAMES, SEE ABOVE

 EXTERNALS           TYPE    ARGS        REFERENCES
        SOFUT                 10              44
        SOQUAS                10              37
        TRPOSE                 8              52

 STATEMENT LABELS             DEF LINE    REFERENCES
     0  5                        19          16
     0  10                       32          29
     0  20                       34          28
   113  90                       40          46
   124  100                      43          38          42
   144  105                      47          42
```

```
      SUBROUTINE INV(NBOX,INPUT,LTAPE,NTP3,NTP4,NTP8,NTP9,NTP1,NTP2,      INV     2
     AISIZE,VEC,BUF,KEY)                                                  INV     3
      DIMENSION VEC(1), BUF(1)                                            INV     4
C                                                                         INV     5
C     INPUT = UNIT CONTAINING MATRIX TO BE INVERTED, POSITIONED           INV     6
C             TO FIRST RECORD                                             INV     7
C     NTP1 = UNIT CONTAINING MATRIX TO BE INVERTED( ROW SORT)             INV     8
C     NTP3 = UNIT CONTAINING INVERTED MATRIX ( COLUMN SORT )              INV     9
C     LTAPE = UNIT CONTAINING INVERTED MATRIX ( ROW SORT )                INV    10
C     NBOX = ORDER OF MATRIX TO BE INVERTED ( MAX = 1200 )                INV    11
C                                                                         INV    12
      KD = 4000                                                           INV    13
      ND = NBOX                                                           INV    14
      M  =  0                                                             INV    15
      REWIND NTP1                                                         INV    16
      DO 5 I = 1, NBOX                                                    INV    17
      READ(INPUT) ( VEC(K) , K = 1, NBOX )                                INV    18
      WRITE( NTP1 ) ( VEC(K), K = 1, NBOX )                               INV    19
    5 CONTINUE                                                            INV    20
      REWIND NTP1                                                         INV    21
      REWIND NTP2                                                         INV    22
      REWIND NTP3                                                         INV    23
      REWIND NTP4                                                         INV    24
      REWIND NTP8                                                         INV    25
      REWIND NTP9                                                         INV    26
      REWIND LTAPE                                                        INV    27
      WRITE(NTP4) NBOX, NBOX                                              INV    28
      DO 20 I = 1, NBOX                                                   INV    29
      DO 10 J = 1, NBOX                                                   INV    30
      VEC(J) = 0.0                                                        INV    31
      IF( J .EQ. I ) VEC(J) = 1.0                                         INV    32
   10 CONTINUE                                                            INV    33
      WRITE(NTP4) ( VEC(K), K = 1, NBOX )                                 INV    34
   20 CONTINUE                                                            INV    35
      REWIND NTP4                                                         INV    36
      IWHICH = 1                                                          INV    37
      CALL SOQUAS (ND,M,KD,NTP1,NTP8,NTP9,NTP2,NTP3,LTAPE,NTP4)           INV    38
      IF (M .EQ. 0) GO TO 100                                             INV    39
      IF (M .EQ.  NBOX) IWHICH=2                                          INV    40
   90 CONTINUE                                                            INV    41
      REWIND NTP3                                                         INV    42
      GO TO (100,105), IWHICH                                             INV    43
  100 CONTINUE                                                            INV    44
      CALL SOFUT (ND,M,KD,NTP1,NTP8,NTP9,NTP2,NTP3,LTAPE,NTP4)            INV    45
      IF (M .EQ.  NBOX) IWHICH = 2                                        INV    46
      GO TO 90                                                            INV    47
  105 CONTINUE                                                            INV    48
      REWIND NTP3                                                         INV    49
      IF( KEY .EQ. 0 ) RETURN                                             INV    50
      REWIND LTAPE                                                        INV    51
      REWIND NTP8                                                         INV    52
      CALL TRPOSE(NTP3,BUF,VEC,NBOX,NBOX,LTAPE,NTP8,ISIZE)                INV    53
      REWIND LTAPE                                                        INV    54
      REWIND NTP3                                                         INV    55
      RETURN                                                              INV    56
      END                                                                 INV    57
```

```
VARIABLES      SN  TYPE            RELOCATION
    0  XO           REAL      ARRAY   POWELL       REFS        9
  322  Z            REAL      ARRAY   POWELL       REFS        9

FILE NAMES          MODE
        TAPE6       FMT                  WRITES        19         27         90

EXTERNALS           TYPE    ARGS        REFERENCES
        AORDER                4              69
        NRM2                  3              20
        SOSCAP      REAL      8              42         49

INLINE FUNCTIONS    TYPE    ARGS          DEF LINE  REFERENCES
        ABS         REAL      1  INTRIN                 58        102
        AMIN1       REAL      0  INTRIN                 24         79         88         89

STATEMENT LABELS                 DEF LINE    REFERENCES
  227  1        FMT                 108          19
  233  2        FMT                 109          90
  210  6        FMT                  30          27
  213  9        FMT   NO REFS        67
   46  10                            50          31         39
   63  15                            62          59
   66  20                            64          56         61
   74  30                            74          86
  102  31                            82          75
  124  40                            94          91
  142  50                           106         101        103
  145  60                           107         100
   21  101                           26          22

LOOPS   LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   30   10        J           31  50        21B                  EXT REFS
   55   20        J           56  64        12B          OPT
  134   50        I          101 106         7B        INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       JGL         4505                0 JSET    (50)             50 JDIM    (1)           51 G       (1750)
                                    1801 LMK     (2500)         4301 BCOEF   (50)        4351 MSTAR   (1)
                                    4352 NOTJ    (50)           4402 NOTDIM  (1)         4403 LINDEP  (50)
                                    4453 LDDIM   (1)            4454 NOTACT  (50,        4504 NDIM    (1)
       POWELL      2732                0 XO      (35)             35 XN      (35)          70 DELX    (35)
                                     105 GRO     (35)            140 GRN     (35)         175 DELG    (35)
                                     210 Z       (35)            245 HO      (1225)      1470 HN      (1225)
                                    2695 HGR     (35)           2730 NPARM   (1)         2731 ICON    (1)
       MAX            1                0 MAXDIM  (1)
       NEWCON        51                0 JNEW    (50)             50 NEWDIM  (1)

STATISTICS
  PROGRAM LENGTH                 606B      390
  CM LABELED COMMON LENGTH     16171B     7289
          52000B CM USED
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VARIABLES       SN  TYPE           RELOCATION
 1602  K            INTEGER                        REFS      56       62       72       79       89       93      103
                                                    105     116      134      161      170      202      203      236
                                                    244     253      260      261      262      296      301      304
                                                    329     334      335      359      368      385      386      387
                                                    389     390      473  DEFINED       52       58       66      198
                                                    259     260      393      472
 1656  KCNT         INTEGER                        REFS     306      307  DEFINED      301      306
    0  KD           INTEGER            F.P.        REFS      27  DEFINED        1
 1657  KEND         INTEGER                        REFS     311  DEFINED      310
 1646  KF           INTEGER                        REFS     263      276      285      310      311
                                                DEFINED     261
 1630  KINIT        INTEGER                        REFS     185      186      187      193      194      219      243
                                                    253 DEFINED      184      253
 1647  KLEFT        INTEGER                        REFS     266  DEFINED      263
 1621  KM1          INTEGER                        REFS     106      206      342      343      414
                                                DEFINED     105      203      262      334
 1666  KOLD         INTEGER                        REFS     415      421      435  DEFINED      385
 1567  KORE         INTEGER                        REFS      34       37       52       60      123      128      138
                                                    149     170      184      258      276      284      358      372
                                                DEFINED      27
 1663  KP1          INTEGER                        REFS     432  DEFINED      335
 1672  KREAD        INTEGER                        REFS     513      514      515  DEFINED      511      514
 1671  KRED         INTEGER                        REFS     513      514  DEFINED      509      513
 1635  KSUM         INTEGER                        REFS     202      225      230  DEFINED      195      202
 1645  KSUMP1       INTEGER                        REFS     232      255  DEFINED      230
 1605  KTEMP        INTEGER                        REFS      62       66  DEFINED       61
 1623  L            INTEGER                        REFS     108  DEFINED      108
 1564  LAST         LOGICAL                        REFS      20       57      121      376  DEFINED       56       67
                                                    329     391
 1563  LASTRS       LOGICAL                        REFS      19      181      506  DEFINED      179
 1620  LBEG         INTEGER                        REFS     107      108      109  DEFINED      104      109
 1622  LEND         INTEGER                        REFS     108  DEFINED      107
 1673  LREAD      * INTEGER                     DEFINED     515
    0  LTAPE        INTEGER            F.P.     DEFINED       1 I/O REFS      103      108      148      171      198
                                                    212     236      314      507      511      516      519
 1571  M            INTEGER                        REFS      35       37       46      122      162      170      176
                                                    178     180      182      184      188      194      257      265
                                                    277     282      326      328      338      344      360      370
                                                    372     405      408      411      412      414      416      424
                                                    430     479      492  DEFINED       34       38      175      181
    0  MD           INTEGER            F.P.     DEFINED       1      528
    0  MM           INTEGER            F.P.        REFS      40  DEFINED        1 I/O REFS      524
 1572  MMAX         INTEGER                        REFS      36       59       60      175  DEFINED       35
 1652  MM1          INTEGER                        REFS     283      310  DEFINED      277
 1615  MN           INTEGER                        REFS      99    2*101      136    2*137      140      147      149
                                                    339     371      418      425      437  DEFINED       95       99
                                                    133     141      338      360      370      416      436
 1624  MNM1         INTEGER                        REFS     148  DEFINED      147
 1577  MP1          INTEGER                        REFS     336      345      348  DEFINED       46      328
 1570  MRHS         INTEGER                        REFS      35      179      181  DEFINED       30       33
 1574  MT           INTEGER                        REFS     445      455      503  DEFINED       40      446      456
                                                    504 I/O REFS       41      119      172      299      308      315
                                                    409     450      487      508      518
 1627  MTOTAL       INTEGER                        REFS     178      179      180      181      182      528
                                                DEFINED     174      178      180      182
 1566  N            INTEGER                        REFS      34       36       37       39       47      184      187
                                                    191     194      216      219      225      232      240      243
```

SN	VARIABLES	TYPE	RELOCATION								
				255	263	265	268	284	325	326	329
				467	481	482	494	514	DEFINED	26	
1667	NA	INTEGER		REFS	419	422	424	DEFINED	418	424	
0	NAT	INTEGER	F.P.	REFS	23	DEFINED	1	I/O REFS	526		
1565	NATAPE	INTEGER		REFS	446	502	DEFINED	23	447	503	
				I/O REFS	24	268	269	407	449	505	
1616	NB	INTEGER		REFS	100	101	139	140	DEFINED	96	100
				135	139	419					
1632	NBEG	INTEGER		REFS	189	207	216	228	249	307	308
				407	DEFINED	186	190	193	207	249	305
				405							
0	ND	INTEGER	F.P.	REFS	26	2*260	296	517	DEFINED	1	
1601	NEL	INTEGER		REFS	2*52	74	83	84	94	114	115
				118	123	161	162	384	386		
				DEFINED	48	161	327	386			
1665	NELOLD	INTEGER		REFS	395	DEFINED	384				
1612	NELP1	INTEGER		REFS	85	91	104	117	142		
				DEFINED	83						
1613	NELP2	INTEGER		REFS	90	DEFINED	85				
1633	NEND	INTEGER		REFS	189	190	191	208	216	229	250
				267	268	305	308	312	313	324	
				DEFINED	187	191	194	208	250	265	267
				300	307	312					
1617	NF	INTEGER		REFS	138	141	2*340	344	347	2*353	417
				433	437	438	461	DEFINED	98	136	339
				344	414	432	435	438			
0	NI	INTEGER	F.P.	REFS	42	DEFINED	1	I/O REFS	523		
1575	NIN	INTEGER		REFS	155	DEFINED	42	156	I/O REFS	43	75
				128	151	167	368	372	466	472	480
				486							
1660	NL	INTEGER		REFS	336	361	363	364	432	433	435
				436	DEFINED	324	361	364	430	461	
1636	NLCNT	INTEGER		REFS	199	510	DEFINED	197	199		
1600	NN	INTEGER		REFS	56	58	109	2*140	212	222	236
				246	352	364	402	403	412	415	433
				480	495	DEFINED	47	138	162	212	220
				236	244	350	359	409	412	415	480
				495							
1651	NNEW	INTEGER		REFS	286	288	302	309	310	311	
				DEFINED	276	286	302	309			
0	NO	INTEGER	F.P.	REFS	44	DEFINED	1	I/O REFS	525		
1653	NOLD	INTEGER		REFS	287	288	DEFINED	284	287		
1576	NOUT	INTEGER		REFS	156	456	DEFINED	44	157	457	
				I/O REFS	45	149	150	168	433	451	488
1614	NP	INTEGER		REFS	98	119	120	122	127	351	352
				418	DEFINED	90	114	120	122	347	351
				413							
1662	NPASS	INTEGER		REFS	337	471	DEFINED	330	337		
1573	NPM	INTEGER		REFS	37	48	327	DEFINED	36	39	326
1640	NPP	INTEGER		REFS	2*223	2*247	268	313	DEFINED	216	240
				266	311						
1661	NREM	INTEGER		REFS	387	389	390	393	399		
				DEFINED	325	387					
1654	NREMAN	INTEGER		REFS	297	298	DEFINED	296			
1642	NROW	INTEGER		REFS	221	222	245	246	401	431	
				DEFINED	219	221	243	245	389	392	517
1610	NS	INTEGER		REFS	75	91	92	96	97	117	119

```
VARIABLES      SN  TYPE            RELOCATION
                                            128       133       148       339       340       341       371       402
                                            409       433       480       482       495   DEFINED        73        84
                                             91       115       117       123       336       369       394       402
                                            474       482       493
  1606  NT          INTEGER                REFS        73        74        75        94        95      2*97       101
                                            118       119       135       137       142       149       157       345
                                            350       353       372       400       403       405       407       408
                                            409       411       414       430       433       436       457       480
                                            481       493       494       495   DEFINED        71        74        92
                                             94       113       118       132       142       149       155       341
                                            345       371       395       400       403       408       411       455
                                            475       481       491       494
  1643  NTBEG       INTEGER                REFS       233       240   DEFINED       228       233
  1670  NTEMP       INTEGER                REFS       447       504   DEFINED       445       502
  1644  NTEND       INTEGER                REFS       234       240   DEFINED       229       234
     0  NW          INTEGER         F.P.   DEFINED       1  I/O REFS        25       495
  1626  N1          INTEGER                REFS       362       363       369       413       474       483
                                        DEFINED       170       358       362       473
  1664  N2          INTEGER                REFS       351       422       423       425     2*426       473       475
                                        DEFINED       348       417       423       425       467       483
     0  RHSTAP      INTEGER         F.P.   REFS        15        29       527   DEFINED         1
                                       I/O REFS        32        33       189       527
  1641  SUM         REAL                   REFS       222       223       246       247       352       353       422
                                            426   DEFINED       218       222       242       246       346       352
                                            420       422
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
        SQRT       REAL     1 LIBRARY      61       259

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE   REFERENCES
        MAXO       INTEGER  0  INTRIN                37
        MINO       INTEGER  0  INTRIN                35

STATEMENT LABELS              DEF LINE   REFERENCES
     0  1          INACTIVE        22
    21  5                          32       29
    25  6                          34       31
    57  10                         52      163
   103  30                         71       57       62
     0  40                         75       72
     0  50                        101       89       93       98
     0  55                        109      106
     0  60                        120      116
     0  65                        140      138
     0  70                        142      134
     0  80                        149      127
   324  90                        167       79      121
     0  105        INACTIVE       170
   342  109                       178      506
     0  110                       191      188
   400  111                       198      255
     0  112                       222      220
     0  113                       223      216
     0  114                       224      206
     0  115                       248      232
   522  116                       257      225
```

```
STATEMENT LABELS                 DEF LINE   REFERENCES
     0  117                         268        266
     0  118                         289        283       285
   677  119                         334        462
     0  120                         352        349
     0  121                         313        304       311
     0  122                         299        298
     0  123                         246        244
     0  124                         247        240
     0  125                         353        343
   626  126                         300        297
   745  130                         354        338       342
     0  135                         363        360
     0  140                         364        359
     0  145                         372        370
  1027  150                         394        390
  1040  160                         404        401
  1053  161                         409        404
  1066  163                         413        410
     0  165                         424        421
     0  170                         426        416
  1144  175                         435        431
     0  180                         438        436
  1156  190                         439        399       434
  1167  195                         450        444
  1200  200                         466        376
     0  210                         482        479
     0  220                         483        471
     0  230                         495        492
  1265  290                         506        497
  1266  295                         507        176
     0  297                         516        510       515
     0  299                         519        517
     0  304          INACTIVE       512
     0  1114         INACTIVE       211
     0  1115         INACTIVE       235
   615  1118                        290        282
     0  9999         INACTIVE       529

LOOPS   LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
  105   40       IB        72  75      14B               EXT REFS
  127   50       IB        89 101      34B               NOT INNER
  134   50       IO        93 101      24B               NOT INNER
  150   50       NF        98 101       3B      INSTACK
  170   55       IB       106 109      14B               EXT REFS
  210   60       IO       116 120      15B               EXT REFS
  233   80       IO       127 149      60B               EXT REFS  NOT INNER
  245   70       IB       134 142      24B               NOT INNER
  257   65       NN       138 140       3B      INSTACK
  356   110      J        188 191      15B               EXT REFS
  407   114      I        206 224      37B               EXT REFS  NOT INNER
  421   113      NPP      216 223      22B               NOT INNER
  431   112      NN       220 222       4B      INSTACK
  454   115      I        232 248      37B               EXT REFS  NOT INNER
  466   124      NPP      240 247      22B               NOT INNER
  476   123      NN       244 246       4B      INSTACK
  546   117      NPP      266 268      20B               EXT REFS  NOT INNER
  553            J        268 268       7B               EXT REFS
```

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
575	118	I	283 289	20B		NOT INNER	
605	118	J	285 289	3B	INSTACK		
621	122	I	298 299	5B		EXT REFS	
633	121	JCNT	304 313	30B		EXT REFS	NOT INNER
654	121	NPP	311 313	3B	INSTACK		
705	130	MN	338 354	43B		NOT INNER	
714	125	IB	343 353	31B		NOT INNER	
727	120	IO	349 352	7B	INSTACK		
752	140	NN	359 364	16B		NOT INNER	
757	135	MN	360 363	3B	INSTACK		
775	145	MN	370 372	21B		EXT REFS	NOT INNER
1003		IO	372 372	7B		EXT REFS	
1032	190	IB	399 439	127B		EXT REFS	NOT INNER
1075	170	MN	416 426	27B		NOT INNER	
1107	165	IO	421 424	4B	INSTACK		
1152	180	MN	436 438	3B	INSTACK		
1205	220	IB	471 483	30B		EXT REFS	NOT INNER
1214	210	IO	479 482	14B		EXT REFS	
1244	230	IO	492 495	14B		EXT REFS	
1274	297	I	510 516	15B		EXT REFS	NOT INNER
1302	297	LREAD	515 516	5B		EXT REFS	
1312	299	NROW	517 519	17B		EXT REFS	

STATISTICS
PROGRAM LENGTH 11537B 4959
52000B CM USED

```
      SUBROUTINE SOFUT (ND,MD,KD,NI,MM,NO,NAT,NW,LTAPE,RHSTAP)                SOFUT     2
C                                                                             SOFUT     3
C   ***   THIS IS THE REAL VERSION OF FUTSOL                                  SOFUT     4
C                                                                             SOFUT     5
C                                                                             SOFUT     6
C                                                                             SOFUT     7
C          ****    ***/ *******  *****  *      ***/       . *                 SOFUT     8
C          *   *  *  /*    *    *      *     *  /*       ******               SOFUT     9
C     **** ****   * / *    *    ***    *     * / *  ****    *  *              SOFUT    10
C          *      */  *    *    *      *     */  *          ***               SOFUT    11
C          *      /***     *    *      ***** /***           *  *              SOFUT    12
C                                                                             SOFUT    13
C               D I R E C T   M A T R I X   S O L U T I O N                   SOFUT    14
C                                                                             SOFUT    15
C     WRITTEN BY J. L. HESS * PROGRAMMED BY C. D. SCHOOR                      SOFUT    16
C*** ***LTAPE IS THE TAPE THE L(I,J) MATRIX WILL BE PUT ON                    SOFUT    17
C*** ***RHSTAP IS THE TAPE THAT THE RIGHT HAND SIDES ARE INPUT ON             SOFUT    18
      INTEGER RHSTAP                                                          SOFUT    19
C                                                                             SOFUT    20
      DIMENSION  A(4000)                                                      SOFUT    21
C                                                                             SOFUT    22
      LOGICAL JPASS1                                                          SOFUT    23
      LOGICAL  LASTRS                                                         SOFUT    24
      LOGICAL  LAST                                                           SOFUT    25
C                                                                             SOFUT    26
    1 CONTINUE                                                                SOFUT    27
      NATAPE = NAT                                                            SOFUT    28
      REWIND NATAPE                                                           SOFUT    29
      REWIND NW                                                               SOFUT    30
      N = ND                                                                  SOFUT    31
      KORE = KD                                                               SOFUT    32
C*** *  RHSTAP = 0 IF THERE ARE NO RHS TO BE PROCESSED THIS RUN               SOFUT    33
      IF(RHSTAP .NE. 0 )GO TO 5                                               SOFUT    34
      MRHS = 0                                                                SOFUT    35
      GO TO 6                                                                 SOFUT    36
    5 REWIND RHSTAP                                                           SOFUT    37
      READ(RHSTAP)MRHS                                                        SOFUT    38
    6 M = KORE/N -1                                                           SOFUT    39
      MMAX = MINO(MRHS,M)                                                     SOFUT    40
      NPM = N + MMAX                                                          SOFUT    41
      IF (MAXO(3 * NPM, M * N) .GT. KORE) RETURN                              SOFUT    42
      M = 0                                                                   SOFUT    43
      NPM = N                                                                 SOFUT    44
      MT = MM                                                                 SOFUT    45
      REWIND MT                                                               SOFUT    46
      NIN = NI                                                                SOFUT    47
      REWIND NIN                                                              SOFUT    48
      NOUT = NO                                                               SOFUT    49
      REWIND NOUT                                                             SOFUT    50
      NN = N                                                                  SOFUT    51
      NEL = NPM                                                               SOFUT    52
C                                                                             SOFUT    53
C - - CALCULATE THE MAXIMUM NO. OF ROWS, 'K'                                  SOFUT    54
C                                                                             SOFUT    55
C*** ***CALCULATE THE NUMBER OF COLUMNS TO BRING OFF OF THE RHS TAPE          SOFUT    56
      MTOTAL = 0                                                              SOFUT    57
      M = MMAX                                                                SOFUT    58
```

```
      IF(M .EQ. O)GO TO 295
C*** ***MTOTALIS THE TOTAL NUMBER OF RHS COLUMNS ALREADY BROUGHT IN
  109 MTOTAL = MTOTAL + M
      LASTRS = MTOTAL.GE. MRHS
      MTOTAL = MTOTAL - M
      IF (LASTRS)M = MRHS - MTOTAL
      MP1 = M + 1
      MM1 = M - 1
      MTOTAL = MTOTAL + M
C*** ***BRING IN M COLUMNS OF RHS
      KINIT = KORE - (M*N)
      IINIT = KINIT
      NBEG = KINIT + 1
      NEND = KINIT+ N
      DO 110 J =1,M
      READ (RHSTAP)( A(I),I=NBEG,NEND)
      NBEG = NEND + 1
  110 NEND = NEND + N
C*** ***BRING IN L(I,J) MATRIX AND APPLY IT TO RHS
      NBEG = 1 + KINIT
      NEND = 1 + (M-1) * N + KINIT
      KSUM = O
      NLCNT = O
C*** ***DO TRIANGULAR SECTION OF LMATRIX
  111 READ (LTAPE)K
      NLCNT = NLCNT + 1
C*** ***KSUM IS THE TOTAL NUMBER OF L ROWS THAT WILL
C*** ***BE READ AFTER THIS TRIANGULAR SECTION IS FINISHED
      KSUM = KSUM + K
      KM1 = K - 1
C***   ***NOTE THAT KM1 CAN'T BE O SINCE K CAN'T BE 1 AND STILL HAVE SOM
C***   ***ON THE LTAPE
      DO 114  I = 1,KM1
      NBEG = NBEG + 1
      NEND = NEND + 1
C*** ***READ 1 ROW OF L(I,J) FROM LTAPE---K-1 TIMES---EACH TIME
C*** ***STARTING WITH L(1)
      READ (LTAPE) ( A(NN),NN=1,I)
      JCNT = -1
C*** ***REDUCE THE RHS BY GOING ACROSS A SOLUTION ROW (WHICH
C*** ***ARE NOT IN CONSECUTIVE ORDER, BUT A(1), A(N+1), A(2N+1) ETC.)
      DO 113 NPP = NBEG,NEND,N
      JCNT = JCNT + 1
      SUM = O.O
      NROW = KINIT + ( JCNT * N )
      DO 112 NN=1,I
      NROW = NROW + 1
  112 SUM = SUM + ( A(NN)*A(NROW))
  113 A(NPP) = A(NPP) - SUM
  114 CONTINUE
      IF (KSUM .EQ. N)GO TO 116
C*** ***KSUM = N IF YOU HAVE READ ENTIRE LMATRIX AND
C*** ***THERE IS NO CONSTANT SECTION LEFT
      NTBEG = NBEG
      NTEND = NEND
      KSUMP1 = KSUM + 1
C*** ***READ REST OF LROWS 1 ROW AT A TIME FOR CONSTANT SECTION
```

```
      DO 115 I=KSUMP1,N                                                 SOFUT     116
      NTBEG = NTBEG + 1                                                 SOFUT     117
      NTEND = NTEND + 1                                                 SOFUT     118
      READ (LTAPE)( A(NN),NN=1,K)                                       SOFUT     119
      JCNT = -1                                                         SOFUT     120
C*** ***PARTIALLY  REDUCE A RHS ACROSS A RHS ROW BY APPLYING K NUMBER    SOFUT     121
C*** ***OF L(I,J) S                                                     SOFUT     122
      DO 124 NPP = NTBEG,NTEND,N                                        SOFUT     123
      JCNT = JCNT + 1                                                   SOFUT     124
      SUM = 0.0                                                         SOFUT     125
      NROW = KINIT + ( JCNT * N )                                       SOFUT     126
      DO 123 NN = 1,K                                                   SOFUT     127
      NROW = NROW + 1                                                   SOFUT     128
  123 SUM = SUM + ( A(NN) * A(NROW) )                                   SOFUT     129
  124 A(NPP) = A(NPP) - SUM                                             SOFUT     130
  115 CONTINUE                                                          SOFUT     131
      NBEG = NBEG + 1                                                   SOFUT     132
      NEND = NEND + 1                                                   SOFUT     133
C*** ***KINIT IS HOW FAR DOWN A COLUMN OF RHS TO START MULTIPLYING BY    SOFUT     134
C*** ***L(I,J) AT EACH PASS THROUGH                                     SOFUT     135
      KINIT = KINIT + K                                                 SOFUT     136
C*** ***IF KSUMP1 = N THERE ARE NO MORE L(I,J)'S LEFT                   SOFUT     137
       IF(KSUMP1 .LT. N)GO TO 111                                       SOFUT     138
C*** ***WRITE OUT ALL BUT LAST K ROWS OF RHS IN ROW ORDER ON NATAPE     SOFUT     139
  116 B = 4*M + 3                                                       SOFUT     140
      C = -2 * KORE                                                     SOFUT     141
      K = (  -B  +  SQRT( B**2  -4.0*C )  )/2.0                         SOFUT     142
      IF(K .GT. ND) K = ND                                              SOFUT     143
      KF = K                                                            SOFUT     144
      KM1 = K - 1                                                       SOFUT     145
      KLEFT = N - KF + IINIT                                            SOFUT     146
      INITP1 = IINIT + 1                                                SOFUT     147
      NEND = (M-1)*N + IINIT                                            SOFUT     148
      DO 117 NPP = INITP1,KLEFT                                         SOFUT     149
      NEND = NEND + 1                                                   SOFUT     150
  117 WRITE(NATAPE) ( A(J),J=NPP,NEND,N)                                SOFUT     151
      REWIND NATAPE                                                     SOFUT     152
C*** ***JPASS1 IS TRUE ON 1ST PASS THRU BACK SOLUTION                   SOFUT     153
      JPASS1 = .TRUE.                                                   SOFUT     154
C                                                                       SOFUT     155
C***   ***PUT REMAINING RHS IN CONTIGUOUS LOCATIONS BY COLUMNS          SOFUT     156
C***  FROM KORE - (M * KF) + 1  TO  KORE                                SOFUT     157
C                                                                       SOFUT     158
      NNEW = KORE - KF + 1                                              SOFUT     159
C                                                                       SOFUT     160
C***   ***IF M = 1, THE ELTS OF THE 1 RHS COLUMN ARE ALREADY IN CONTIGUO SOFUT     161
C***   ***LOCATIONS                                                     SOFUT     162
C                                                                       SOFUT     163
      IF (M.EQ.1)  GO TO 1118                                           SOFUT     164
      DO 118 I = 1,MM1                                                  SOFUT     165
      NOLD = KORE - (I*N) + 1                                           SOFUT     166
      DO 118 J = 1,KF                                                   SOFUT     167
      NNEW = NNEW - 1                                                   SOFUT     168
      NOLD = NOLD - 1                                                   SOFUT     169
      A(NNEW) = A(NOLD)                                                 SOFUT     170
  118 CONTINUE                                                          SOFUT     171
 1118 CONTINUE                                                          SOFUT     172
```

```
      C
      C***    ***NOW NNEW = KORE - (M*KF) + 1
      C***    ***NOW NOLD = KORE - (M - 1) * N + 1 - KF
      C  **    SKIP 1ST PART OF TRAPEZOIDAL MATRIX ON LTAPE
      C  **    READ IN LAST K ROWS OF TRAPEZOIDAL MATRIX AND
      C*** ***ATTATCH RHS TO IT SO THAT EVERYTHING IS IN CONSECUTIVE ORDER
            NREMAN = ND - K
            IF( NREMAN .EQ. O )GO TO 126
            DO 122 I=1,NREMAN
        122 READ(LTAPE) IDUMMY
        126 NEND = O
            KCNT = K
            NNEW = NNEW - 1
      C***    ***NOTE THAT K = KF WHICH IS ALREADY KNOWN IN CORE
            DO 121 JCNT = 1,K
            NBEG = NEND + 1
            KCNT = KCNT - 1
            NEND = NBEG + KCNT
            READ(LTAPE)IDUMMY,(A(J),J=NBEG,NEND)
            NNEW = NNEW + 1
            KEND = (MM1 * KF) + NNEW
            DO 121 NPP=NNEW,KEND,KF
            NEND = NEND + 1
        121 A(NEND) = A(NPP)
            REWIND LTAPE
      C
      C  **  SKIP OVER L MATRIX ON LTAPE TO GET TO TRAPEZOIDAL MATRIX
      C
            KRED = O
            DO 128 I=1,NLCNT
            READ(LTAPE)KREAD
            KRED = KRED + KREAD
            KREAD = KREAD + ( N - KRED - 1)
            DO 128 LREAD = 1,KREAD
        128 READ(LTAPE)
      C
      C - - THERE, NOW WE CAN START THE BACK-SOLUTION
      C * * NOTE..THE FIRST AVAILABLE LOCATION FOR THE SOLUTIONS IS A(N1)
      C
      C
      C***    ***NL IS THE LAST SUBSCRIPT + 1 OF THE TRAPEZOIDAL A MATRIX THAT
      C***    ***CORE
      C
            NL = NEND + 1
            NREM = N
            NPM = N + M
            NEL = NPM
            MP1 = M + 1
            LAST = K .EQ. N
            NPASS = O
      C
      C - - SOLVE FOR THE ANSWERS CORRESPONDING TO 'K' ROWS
      C
        119 KM1 = K - 1
            KP1 = K + 1
            NS = NL - MP1
            NPASS = NPASS + 1
```

```
      DO 130 MN = 1, M
      NF = NS + MN
      A(NF) = A(NF) / A(NS)
      NT = NS
      IF (KM1 .EQ. 0) GO  TO 130
      DO 125 IB = 1, KM1
      NF = NF - IB - M
      NT = NT - MP1 - IB
      SUM = 0.0
      NP = NF
      N2 = MP1 + IB
      DO 120 IO = 1, IB
      NN = NT + IO
      NP = NP + N2 - IO
  120 SUM = SUM + A(NN) * A(NP)
  125 A(NF) = (A(NF) - SUM) / A(NT)
  130 CONTINUE
C
C - - MOVE THE SOLUTIONS TO CONTIGUOUS LOCATIONS STARTING AT A(N1)
C
      N1 = KORE + 1
      DO 140 NN = 1, K
      DO 135 MN = 1, M
      NL = NL - 1
      N1 = N1 - 1
  135 A(N1) = A(NL)
  140 NL = NL - NN
C
C - - WRITE THE SOLUTIONS ON TAPE
C
      WRITE (NIN) K
      NS = N1 - 1
      DO 145 MN = 1, M
      NT = NS + MN
  145 WRITE ( NIN ) (A(IO), IO = NT, KORE, M)
C
C - - TEST IF THIS IS THE LAST PASS
C
      IF (LAST) GO TO 200
C
C - - WE MUST NOW MODIFY THE TRIANGULAR MATRIX TO REFLECT THE EFFECT OF
C     THE SOLUTIONS OBTAINED SO FAR  (EQ 21)
C * * NOTE..LOCATIONS A(1) TO A(N1-1) ARE NOW FREE TO USE
C
C - - CALCULATE THE NEXT VALUES OF 'NEL' AND 'NREM'
C
      NELOLD = NEL
      KOLD = K
      NEL = NEL - K
      NREM = NREM - K
C
      NROW = NREM - K + 1
      IF (K .LT. NREM) GO TO 150
      LAST = .TRUE.
      NROW = 1
      K = NREM
  150 NS = 1
```

```
      NT = NELOLD + 1
C
C - - READ IN THE ROWS TO BE MODIFIED
C
      DO 190 IB = 1, NREM
      NT = NT - 1
      IF (IB .LE. NROW) GO TO 160
      NS = NS + NN
      NT = NT + NN
  160 IF (.NOT. JPASS1)GO TO 161
      NBEG = NT - M + 1
C*** ***READ RHS FROM NATAPE
      READ (NATAPE) ( A(IO),IO = NBEG,NT)
      NT = NT - M
      READ(LTAPE)NN,(A(IO),IO=NS,NT)
      NT = NT + M
      NN = NN + M
      GO TO 163
  161 READ(MT)NN,(A(IO),IO=NS,NT)
  163 NP = N1 - 1
      NF = NT - M - KM1
      NN = NN - KOLD
      DO 170 MN = 1, M
      N2 = NF
      NA = NP + MN
      NB = NA
      SUM = 0.0
      DO 165 IO = 1, KOLD
      SUM = SUM + A(N2) * A(NA)
      N2 = N2 + 1
  165 NA = NA + M
      N2 = N2 + MN - 1
  170 A(N2) = A(N2) - SUM
C
C - - WRITE THE MODIFIED ROW ON TAPE OR CONDENSE THE ROW
C
      NL = NT - M + 1
      IF (IB .GE. NROW) GO TO 175
      NF = NL - KP1
      WRITE (NOUT) NN, (A(IO), IO = NS, NF), (A(IO), IO = NL, NT)
      GO TO 190
  175 NF = NL - KOLD
      DO 180 MN = NL, NT
      A(NF) = A(MN)
  180 NF = NF + 1
  190 CONTINUE
      IF( .NOT. JPASS1 ) GO TO 195
      JPASS1= .FALSE.
      REWIND NATAPE
  195 REWIND MT
      REWIND NOUT
C
C - - SWITCH THE TAPES
C
      NT = MT
      MT = NOUT
      NOUT = NT
```

```
C
C - - LOOP BACK THRU THE SOLUTION
C
      NL = NF
      GO TO 119
C
C - - START TO WRAP IT UP
C
  200 REWIND NIN
      N2 = N
C
C * * NOTE.. AT THIS POINT ALL LOCATIONS A(1) THRU A(KORE) ARE FREE
C
      DO 220 IB = 1, NPASS
      READ (NIN) K
      N1 = N2 - K + 1
      NS = N1
      NT = N2
C
C - - READ IN THE SOLUTIONS
C
      DO 210 IO = 1, M
      READ (NIN) (A(NN), NN = NS, NT)
      NT = NT + N
  210 NS = NS + N
  220 N2 = N1 - 1
C
C  ---  REWIND ALL INPUT TAPES
      REWIND NIN
      REWIND MT
      REWIND NOUT
C - - WRITE THE SOLUTIONS ON TAPE
C
      NT = 0
      DO 230 IO = 1, M
      NS = NT + 1
      NT = NT + N
  230 WRITE (NW) (A(NN), NN = NS, NT)
C
      IF(LASTRS) GO TO 295
C*** ***IF THERE ARE MORE RHS TO BE GOTTEN FROM RHS TAPE, SWITCH TAPES
C*** ***BACK SO THAT  MT WILL CONAIN THE TRAPEZOIDAL MATRIX
C*** ***NATAPE WILL HAVE NOTHING USEFUL ON IT.
      NTEMP = NATAPE
      NATAPE = MT
      MT = NTEMP
      REWIND NATAPE
      REWIND LTAPE
      GO TO 109
  295 CONTINUE
C
C   ***   REWIND ALL FILES EXCEPT THE OUTPUT FILE   NW
C
      REWIND NI
      REWIND MM
      REWIND NO
      REWIND NAT
```

```
  400           REWIND RHSTAP                                         SOFUT     401
                MD = MTOTAL                                           SOFUT     402
           9999 CONTINUE                                              SOFUT     403
                RETURN                                                SOFUT     404
                END                                                   SOFUT     405


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  SOFUT           1           41        40^

VARIABLES     SN  TYPE             RELOCATION
 1315  A          REAL        ARRAY           REFS      20     2*105     106    2*128      129      150      169
                                               195   2*231    2*243   2*244      254      263    2*314      318
                                             2*325     329      380  DEFINED       73       95      106      118
                                               129     169      190     19^      231      244      254      298
                                               300     304      318     329      365
 1255  B          REAL                        REFS   2*141  DEFINED     139
 1256  C          REAL                        REFS     141  DEFINED     140
 1241  I          INTEGER                     REFS      73       95     103      165  DEFINED       73       90
                                               115     164      180     201
 1303  IB         INTEGER                     REFS     235      236     239      240      292      323
                                           DEFINED     234      290     356
 1265  IDUMMY     INTEGER                  DEFINED     181      190
 1235  IINIT      INTEGER                     REFS     145      146     147  DEFINED       69
 1261  INITP1     INTEGER                     REFS     148  DEFINED     146
 1306  IO         INTEGER                     REFS     241      242     263      298      300      304    2*325
                                           DEFINED     240      263     298      300      304      313    2*325
                                               364     377
 1240  J          INTEGER                     REFS     150      190  DEFINED       72      150      166      190
 1246  JCNT       INTEGER                     REFS     100      102     123      125  DEFINED       96      100
                                               119     123      186
 1212  JPASS1     LOGICAL                     REFS      22      295     332  DEFINED      153      333
 1244  K          INTEGER                     REFS      86       87     118      126      135      142      143
                                               144     178      183     186      220      225      226      250
                                               259     276      277     278      280      281      358
                                           DEFINED      82      141     142      284      357
 1266  KCNT       INTEGER                     REFS     188      189  DEFINED      183      188
    0  KD         INTEGER            F.P.     REFS      31  DEFINED       1
 1267  KEND       INTEGER                     REFS     193  DEFINED     192
 1257  KF         INTEGER                     REFS     145      158     166      192      193
                                           DEFINED     143
 1234  KINIT      INTEGER                     REFS      69       70      71       77       78      102      125
                                               135 DEFINED       68     135
 1260  KLEFT      INTEGER                     REFS     148  DEFINED     145
 1245  KM1        INTEGER                     REFS      90      233     234      306  DEFINED       87      144
                                               225
 1311  KOLD       INTEGER                     REFS     307      313     327  DEFINED      276
 1217  KORE       INTEGER                     REFS      38       41      68      140      158      165      249
                                               263 DEFINED       31
 1276  KP1        INTEGER                     REFS     324  DEFINED     226
 1271  KREAD      INTEGER                     REFS     203      204     205  DEFINED      202      204
 1270  KRED       INTEGER                     REFS     203      204  DEFINED      200      203
```

VARIABLES		SN TYPE	RELOCATION								
1242	KSUM	INTEGER		REFS	86	108	113	DEFINED	79	86	
1254	KSUMP1	INTEGER		REFS	115	137	DEFINED	113			
1214	LAST	LOGICAL		REFS	24	267	DEFINED	220	282		
1213	LASTRS	LOGICAL		REFS	23	63	382	DEFINED	61		
1272	LREAD	* INTEGER		DEFINED	205						
0	LTAPE	INTEGER	F.P.	DEFINED	1	I/O REFS	82	95	118	181	190
				196	202	206	300	390			
1221	M	INTEGER		REFS	39	41	58	60	62	64	65
				66	68	72	78	139	147	163	217
				219	229	235	251	261	263	296	299
				301	302	306	308	316	322	364	377
				DEFINED	38	42	57	63			
0	MD	INTEGER	F.P.	DEFINED	1	401					
0	MM	INTEGER	F.P.	REFS	44	DEFINED	1	I/O REFS	397		
1222	MMAX	INTEGER		REFS	40	57	DEFINED	39			
1233	MM1	INTEGER		REFS	164	192	DEFINED	65			
1300	MN	INTEGER		REFS	230	262	310	317	329		
				DEFINED	229	251	261	308	328		
1232	MP1	INTEGER		REFS	227	236	239	DEFINED	64	219	
1220	MRHS	INTEGER		REFS	39	61	63	DEFINED	34	37	
1224	MT	INTEGER		REFS	340	387	DEFINED	44	341	388	
				I/O REFS	45	304	335	372			
1231	MTOTAL	INTEGER		REFS	60	61	62	63	66	401	
				DEFINED	56	60	62	66			
1216	N	INTEGER		REFS	38	40	41	43	50	68	71
				75	78	99	102	108	115	122	125
				137	145	147	150	165	204	216	217
				220	352	366	367	379	DEFINED	30	
1312	NA	INTEGER		REFS	311	314	316	DEFINED	310	316	
0	NAT	INTEGER	F.P.	REFS	27	DEFINED	1	I/O REFS	399		
1215	NATAPE	INTEGER		REFS	386	DEFINED	27	387	I/O REFS	28	150
				151	298	334	389				
1313	NB	* INTEGER		DEFINED	311						
1236	NBEG	INTEGER		REFS	73	91	99	111	131	189	190
				298	DEFINED	70	74	77	91	131	187
				296							
0	ND	INTEGER	F.P.	REFS	30	2*142	178	DEFINED	1		
1230	NEL	INTEGER		REFS	275	277	DEFINED	51	218	277	
1310	NELOLD	INTEGER		REFS	286	DEFINED	275				
1237	NEND	INTEGER		REFS	73	74	75	92	99	112	132
				149	150	187	190	194	195	215	
				DEFINED	71	75	78	92	132	147	149
				182	189	194					
1301	NF	INTEGER		REFS	2*231	235	238	2*244	309	325	329
				330	346	DEFINED	230	235	306	324	327
				330							
0	NI	INTEGER	F.P.	REFS	46	DEFINED	1	I/O REFS	396		
1225	NIN	INTEGER		DEFINED	46	I/O REFS	47	259	263	351	357
				365	371						
1273	NL	INTEGER		REFS	227	252	254	255	324	325	327
				328	DEFINED	215	252	255	322	346	
1243	NLCNT	INTEGER		REFS	83	201	DEFINED	80	83		
1227	NN	INTEGER		REFS	95	105	118	128	243	255	293
				294	302	307	325	365	380		
				DEFINED	50	95	103	118	126	241	250
				300	302	304	307	365	380		
1262	NNEW	INTEGER		REFS	167	169	184	191	192	193	

```
      SUBROUTINE TRIXY(INA,INB,IOC,NROW,MM,NCOL,A,B,C,LENGTH,IRET)       TRIXY   2
C                                                                        TRIXY   3
C                                                                        TRIXY   4
C  ****************************************************************     TRIXY   5
C  *                                                              *     TRIXY   6
C  *  COLUMN-SORT MATRIX MULTIPLIER...... MULTIPLIES RECTANGULAR   *     TRIXY   7
C  *  MATRIX A (STORED IN COLUMN SORT ON INA) BY MATRIX B          *     TRIXY   8
C  *  (STORED IN COLUMN SORT ON INB) AND PUTS RESULTING MATRIX     *     TRIXY   9
C  *  C ONTO IOC IN COLUMN SORT.  OPERATIONS ARE DONE BY STORING   *     TRIXY  10
C  *  P COLUMNS OF A AND B IN CORE AT SAME TIME.  REQUIRES ONLY    *     TRIXY  11
C  *  P REWINDS OF INA.  (A IS NROW BY MM, B IS MM BY NCOL).       *     TRIXY  12
C  *                                                              *     TRIXY  13
C  ****************************************************************     TRIXY  14
C                                                                        TRIXY  15
C***** INA    = INPUT UNIT CONTAINING MATRIX A                           TRIXY  16
C***** INB    = INPUT UNIT CONTAINING MATRIX B                           TRIXY  17
C***** IOC    = OUTPUT UNIT CONTAINING MATRIX C                          TRIXY  18
C***** NROW   = NUMBER OF ROWS IN A AND C                                TRIXY  19
C***** MM     = NUMBER OF COLUMNS IN A = NUMBER OF ROWS IN B             TRIXY  20
C***** NCOL   = NUMBER OF COLUMNS IN B AND C                             TRIXY  21
C***** A      = BUFFER TO HOLD A PART OF A                               TRIXY  22
C***** B      = BUFFER TO HOLD A PART OF B                               TRIXY  23
C***** C      = BUFFER TO HOLD A PART OF C                               TRIXY  24
C***** LENGTH = SIZE OF EACH BUFFER                                      TRIXY  25
C***** IRET   = 0 OUT-OF-CORE STORAGE NEEDED                             TRIXY  26
C*****        = 1 ALL MATRICES CAN BE FIT IN CORE                        TRIXY  27
C                                                                        TRIXY  28
      DIMENSION A(LENGTH), B(LENGTH), C(LENGTH)                          TRIXY  29
CIBM                                                                     TRIXY  30
C     REAL*8 SUM                                                         TRIXY  31
CIBM                                                                     TRIXY  32
      REWIND INA                                                         TRIXY  33
   99 IRET=0                                                             TRIXY  34
C                                                                        TRIXY  35
C COMPUTE P AS THE LARGEST NO. OF WHOLE                                  TRIXY  36
C COLUMNS THAT CAN FIT IN CORE STORAGE. IF ALL                           TRIXY  37
C COLUMNS OF A CAN FIT DO MULTIPLICATION DIRECTLY.                       TRIXY  38
C                                                                        TRIXY  39
      IP1= LENGTH/NROW                                                   TRIXY  40
      IP2= LENGTH/MM                                                     TRIXY  41
      IP = MINO(IP1,IP2)                                                 TRIXY  42
      IF(IP1.LT.MM) GO TO 10                                             TRIXY  43
C                                                                        TRIXY  44
C READ IN ALL OF A                                                       TRIXY  45
C                                                                        TRIXY  46
      DO 1 I= 1,MM                                                       TRIXY  47
      II= (I-1)*NROW + 1                                                 TRIXY  48
      CALL RNRW(-INA,A(II),NROW)                                         TRIXY  49
    1 CONTINUE                                                           TRIXY  50
C                                                                        TRIXY  51
C READ A COLUMN OF B AND DOT                                             TRIXY  52
C WITH ROW OF A TO FORM ENTRY                                            TRIXY  53
C IN COL OF C.  WRITE OUT C                                              TRIXY  54
C WHEN COL IS FILLED.                                                    TRIXY  55
C                                                                        TRIXY  56
      DO 2 J= 1,NCOL                                                     TRIXY  57
      CALL RNRW(-INB,B(1),MM)                                            TRIXY  58
```

```
INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       FLOAT      REAL       1  INTRIN             53
       IFIX       INTEGER    1  INTRIN             64         98        148        154

STATEMENT LABELS             DEF LINE   REFERENCES
   37  1                        54          49         51
  101  2                        78          62         74
   42  3                        55          46         48
    0  6                        73          66         69
   75  8                        75          72
    0  20                      100          95
  136  30                      102          99
  153  40                      108         101
    0  50                      109          91
    0  60                      135         133
    0  70                      125         124
    0  80                      127         121
    0  90                      150         146
  311  100                     158         144        152        155
    0  110                     168         165
    0  999         INACTIVE    169

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   24  3        I          46 55        21B               NOT INNER
   34  1        J          49 54         5B     INSTACK
   51  2        I          62 78        33B               NOT INNER
   57  6        L          66 73        16B                 EXITS   NOT INNER
   62  6        J          69 73        10B        OPT      EXITS
  113  50       I          91 109       46B               EXT REFS  NOT INNER
  124  20       J          95 100       11B        OPT      EXITS
  175  80       I         121 127       32B               EXT REFS  NOT INNER
  212  70       K         124 125        4B     INSTACK
  233  60       I         133 135       12B               EXT REFS
  254  100      I         144 158       40B               EXT REFS  NOT INNER
  264  90       J         146 150        5B     INSTACK
  320  110      I         165 168       12B               EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       STORES      457                 0 NUMSTR (1)             1 KCONST (1)              2 ISTDOF (30)
                                      32 IDYDOF (30)           62 IDSTR  (5)             67 STRWI  (5)
                                      72 STRWO  (5)            77 STRWN  (5)             82 STRII  (15)
                                      97 STRIO  (15)          112 STRIN  (15)           127 STRRI  (15)
                                     142 STRRO  (15)          157 STRRN  (15)           172 STRWDO (5)
                                     177 STRWDN (5)           182 STRIDO (15)           197 STRIDN (15)
                                     212 STRRDO (15)          227 STRRDN (15)           242 SCALE  (65)
                                     307 STRFI  (30)          337 STRFO  (30)           367 STRFN  (30)
                                     397 STRFDO (30)          427 STRFDN (30)
       INVERT      125                 0 INVERT (1)             1 IUA2   (1)              2 IFLEX  (1)
                                       3 AORD   (30)           33 IPERM  (30)            63 NSTOR  (60)
                                     123 IPREV  (1)           124 NDOFT  (1)
       CTAPES       50                 0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                6527B     3415
  CM LABELED COMMON LENGTH      1170B      632
        52000B CM USED
```

```
VARIABLES      SN  TYPE          RELOCATION
 4531  NAME4       INTEGER    ARRAY                REFS        20       140   DEFINED       23
 4533  NAME5       INTEGER    ARRAY                REFS        20       163   DEFINED       24
  174  NDOFT       INTEGER            INVERT       REFS        15        62        95      140       146      151      152
                                                    156     2*163       165       166      167   DEFINED       56
   77  NSTOR       INTEGER    ARRAY   INVERT       REFS        15       102       103  DEFINED        76       77
    0  NUMSTR      INTEGER            STORES       REFS         8
  546  N1      .   INTEGER                         REFS       117   DEFINED        31  I/O REFS     119      122      141
                                                    156       164       166
  557  N10         INTEGER                         REFS       117   DEFINED        40  I/O REFS      82       93      116
  547  N2          INTEGER                         REFS       117   DEFINED        32  I/O REFS     120      123
  550  N3          INTEGER                         REFS       117   DEFINED        33  I/O REFS     118      126      132
                                                    134       142       145
  551  N4          INTEGER                         REFS       117   DEFINED        34
  552  N5          INTEGER                         REFS       117   DEFINED        35
  553  N6          INTEGER                         REFS       117   DEFINED        36
  554  N7          INTEGER                         REFS       117   DEFINED        37
  555  N8      *   INTEGER                      DEFINED        38
  556  N9      *   INTEGER                      DEFINED        39
  362  SCALE       REAL       ARRAY   STORES       REFS         8
  653  STRFDN      REAL       ARRAY   STORES       REFS         8
  615  STRFDO      REAL       ARRAY   STORES       REFS         8
  463  STRFI       REAL       ARRAY   STORES       REFS         8       104       106  DEFINED       105
  557  STRFN       REAL       ARRAY   STORES       REFS         8       107   DEFINED       106
  521  STRFO       REAL       ARRAY   STORES       REFS         8
  305  STRIDN      REAL       ARRAY   STORES       REFS         8
  266  STRIDO      REAL       ARRAY   STORES       REFS         8
  122  STRII       REAL       ARRAY   STORES       REFS         8
  160  STRIN       REAL       ARRAY   STORES       REFS         8
  141  STRIO       REAL       ARRAY   STORES       REFS         8
  343  STRRDN      REAL       ARRAY   STORES       REFS         8
  324  STRRDO      REAL       ARRAY   STORES       REFS         8
  177  STRRI       REAL       ARRAY   STORES       REFS         8
  235  STRRN       REAL       ARRAY   STORES       REFS         8
  216  STRRO       REAL       ARRAY   STORES       REFS         8
  261  STRWDN      REAL       ARRAY   STORES       REFS         8
  254  STRWDO      REAL       ARRAY   STORES       REFS         8
  103  STRWI       REAL       ARRAY   STORES       REFS         8
  115  STRWN       REAL       ARRAY   STORES       REFS         8
  110  STRWO       REAL       ARRAY   STORES       REFS         8
  601  VALUE       REAL                            REFS       106       107   DEFINED       104
  607  VEC1        REAL       ARRAY                REFS        19        92        93      105       108      117      125
                                                    135       149       167   DEFINED      107       122      134      145
                                                    166
 2557  VEC2        REAL       ARRAY                REFS        19       117       125      151       156
                                                DEFINED       123       149
 4535  VEC3        REAL       ARRAY                REFS        21       126   DEFINED       125
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS       REFERENCES
       AORDER                  4            60
       DCLOSE                  1           110       170
       GEDLAB                  6            83
       GETROW                  4            92
       INV                    13           117
       PUDLAB                  6            90       131       140       163
       PUTROW                  4           108       135       151       167
       TIMEB                   2            30       171
```

```
                 RETURN                                                                         DYNSTF     173
                 END                                                                            DYNSTF     174



         SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
    1  DYNSTF          1          172

 VARIABLES       SN  TYPE            RELOCATION
     3  AORD         REAL       ARRAY     INVERT       REFS        15        60        64        98       148       154
                                                    DEFINED        53
   561  I            INTEGER                           REFS        47        63        76        77        99       105       107
                                                        155   DEFINED        46        62        91       121       133       144
                                                        165
   566  IC           INTEGER                           REFS        67        71        76   DEFINED        65        67
   560  ICT          INTEGER                           REFS        52        53        56        60   DEFINED        45        52
   562  ID           INTEGER                           REFS        48        50        72        99       149       155
                                                    DEFINED        47        64        98       148       154
    76  IDSTR        INTEGER    ARRAY     STORES       REFS         8        47        76
    40  IDYDOF       INTEGER    ARRAY     STORES       REFS         8        50        71
   571  ID2          INTEGER                           REFS        72   DEFINED        71
     2  IFLEX        INTEGER              INVERT       REFS        15
   602  INUM         INTEGER                           REFS       152       153       157   DEFINED       143       157
     0  INVERT       INTEGER              INVERT       REFS        15
   565  IP           INTEGER                           REFS        64        98       148       154   DEFINED        63        97
                                                        147       153
    41  IPERM        INTEGER    ARRAY     INVERT       REFS        15        60        63        97       147       153
   173  IPREV        INTEGER              INVERT       REFS        15
   564  IR           INTEGER                           REFS        51        53   DEFINED        50
     2  ISTDOF       INTEGER    ARRAY     STORES       REFS         8
     0  ITAPES       INTEGER    ARRAY     CTAPES       REFS        17        31        32        33        34        35        36
                                                         37        38        39        40
   574  IUA          INTEGER                           REFS        90       108       110   DEFINED        88
     1  IUA2         INTEGER              INVERT       REFS        15        83        92       131       135       140       151
                                                        163       167       170
   563  J            INTEGER                           REFS        50        97       122       123       126       134       147
                                                        149   DEFINED        49        69        95       122       123       126
                                                        134       146
   570  JC           INTEGER                           REFS        70        71        77   DEFINED        68        70
   600  JCOL         INTEGER                           REFS       104       105     2*106       107   DEFINED       103
   576  JCT          INTEGER                           REFS        96       102       103   DEFINED        94        96
   577  JSTORE       INTEGER                           REFS       104       105     2*106       107   DEFINED       102
   575  K            INTEGER                           REFS        93     3*125       145       156       166
                                                    DEFINED        93       124       145       156       166
   573  KCOL         INTEGER                           REFS        83        90        92        93       108       122       123
                                                        124       126       131       134       135       145
     !  KCONST       INTEGER              STORES       REFS         8
   572  KROW         INTEGER                           REFS        83        90        91       117       121       131       133
                                                        140       144
   567  L          * INTEGER                        DEFINED        66
   603  NAME         INTEGER   *UNDEF                  REFS        19
   605  NAME2        INTEGER    ARRAY                  REFS        19       131   DEFINED        25
  4527  NAME3        INTEGER    ARRAY                  REFS        19        83        90   DEFINED        26
```

```
      C
            REWIND N10
            CALL INV(KROW,N10,N2,N1,N3,N4,N5,N6,N7,1000,VEC1,VEC2,1)
            REWIND N3
            REWIND N1
            REWIND N2
            DO 80 I = 1, KROW
            READ(N1) ( VEC1(J), J =1, KCOL )
            READ(N2) ( VEC2(J), J = 1, KCOL )
            DO 70 K = 1, KCOL
         70 VEC3(K) = .5 * ( VEC1(K) + VEC2(K) )
            WRITE(N3) ( VEC3(J) , J = 1, KCOL )
         80 CONTINUE
      C
      C     WRITE STIFFNESS MATRIX ON FILE 2 OF UNIT IUA2.
      C
            CALL PUDLAB (8HDYNSTF03,IUA2,NAME2,2,KROW,KCOL)
            REWIND N3
            DO 60 I = 1, KROW
            READ(N3) ( VEC1(J), J = 1, KCOL )
         60 CALL PUTROW(IUA2,2,VEC1,KCOL)
      C
      C     WRITE FULL COLUMNS OF STIFNESS MATRIX CORRESPONDING
      C     TO PYLON D.O.F. ON FILE 3 OF UNIT IUA2.
      C
            CALL PUDLAB (8HDYNSTF04,IUA2,NAME4,3,KROW,NDOFT)
            REWIND N1
            REWIND N3
            INUM = 1
            DO 100 I = 1, KROW
            READ(N3) ( VEC1(K), K = 1, KCOL )
            DO 90 J = 1, NDOFT
            IP = IPERM(J)
            ID = IFIX( AORD(IP) )
            VEC2(J) = VEC1( ID )
         90 CONTINUE
            CALL PUTROW( IUA2, 2, VEC2, NDOFT )
            IF( INUM .GT. NDOFT ) GO TO 100
            IP = IPERM( INUM )
            ID = IFIX( AORD(IP) )
            IF( I .NE. ID ) GO TO 100
            WRITE(N1) ( VEC2(K), K = 1, NDOFT )
            INUM = INUM + 1
        100 CONTINUE
      C
      C     WRITE PARTITION OF STIFFNESS MATRIX CORRESPONDING
      C     TO PYLON D.O.F. ON FILE 4 OF UNIT IUA2.
      C
            CALL PUDLAB (8HDYNSTF05,IUA2,NAME5,4,NDOFT,NDOFT)
            REWIND N1
            DO 110 I = 1, NDOFT
            READ(N1) ( VEC1(K), K =1, NDOFT )
            CALL PUTROW(IUA2,2,VEC1, NDOFT )
        110 CONTINUE
        999 CONTINUE
            CALL DCLOSE(IUA2)
            CALL TIMEB(21,21H FROM DYNSTF, AT END )
```

```
C     DETERMINE ASCENDING ORDER OF DY.DO.F. IN AORD.
C
      CALL AORDER(AORD,ICT,IPERM,1)
C
      DO 2 I = 1, NDOFT
      IP = IPERM(I)
      ID = IFIX( AORD(IP) )
      IC = 0
      DO 6 L = 1, 5
      IC = IC + 1
      JC = 0
      DO 6 J = 1, 6
      JC = JC + 1
      ID2 = IDYDOF( IC, JC )
      IF( ID2 .EQ. ID ) GO TO 8
    6 CONTINUE
      GO TO 2
    8 CONTINUE
      NSTOR(I,1) = IDSTR( IC )
      NSTOR(I,2) = JC
    2 CONTINUE
C
C     READ DYNAMIC FLEXIBILITY MATRIX AND PLACE ON UNIT N10 AND 14.
C
      REWIND N10
      CALL GEDLAB (8HDYNSTFO1,IUA2,NAME3,1,KROW,KCOL)
CIBM
C     IUA = 14
CIBM
CCDC
      IUA = 11
CCDC
      CALL PUDLAB (8HDYNSTFO2,IUA,NAME3,1,KROW,KCOL)
      DO 50 I = 1, KROW
      CALL GETROW(IUA2,1,VEC1,KCOL)
      WRITE(N10) ( VEC1(K), K = 1, KCOL )
      JCT = 0
      DO 20 J = 1, NDOFT
      JCT = JCT + 1
      IP = IPERM( J )
      ID = IFIX( AORD(IP) )
      IF( ID .EQ. I ) GO TO 30
   20 CONTINUE
      GO TO 40
   30 JSTORE = NSTOR( JCT, 1 )
      JCOL = NSTOR( JCT, 2 )
      VALUE = STRFI( JSTORE, JCOL )
      STRFI( JSTORE, JCOL ) = VEC1(I)
      IF( VALUE .EQ. 0.0 ) STRFN(JSTORE,JCOL) = STRFI(JSTORE,JCOL)
      IF( VALUE .NE. 0.0 ) VEC1(I) = STRFN(JSTORE,JCOL )
   40 CALL PUTROW (IUA,-1,VEC1,KCOL)
   50 CONTINUE
      CALL DCLOSE (IUA)
C
C     INVERT MATRIX ON N10 TO FORM DYNAMIC STIFFNESS MATRIX.
C     THIS MATRIX IS IN COLUMN SORT ON UNIT N1.
C     MATRIX IS ALSO ON N2 IN ROW SORT.
```

```
      SUBROUTINE DYNSTF                                                 DYNSTF     2
C                                                                       DYNSTF     3
C     THIS SUBROUTINE READS THE DYNAMIC FLEXIBILITY MATRIX              DYNSTF     4
C     FROM UNIT IUA2, INVERTS SAME, AND WRITES THE RESULTING            DYNSTF     5
C     DYNAMIC STIFFNESS MATRIX INTO FILE 7 ON UNIT IUA2.                DYNSTF     6
C     THE DFM IS ALSO WRITTEN ON UNIT 14, FILE 1.                       DYNSTF     7
C                                                                       DYNSTF     8
      COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    DYNSTF     9
     A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)           DYNSTF    10
     B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                DYNSTF    11
     C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                DYNSTF    12
     D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                        DYNSTF    13
     E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                           DYNSTF    14
     F      ,STRFDO(5,6),STRFDN(5,6)                                    DYNSTF    15
      COMMON/ INVERT / INVERT,IUA2,IFLEX,AORD(30),IPERM(30),NSTOR(30,2) DYNSTF    16
     A,IPREV,NDOFT                                                      DYNSTF    17
      COMMON/ CTAPES / ITAPES(50)                                       DYNSTF    18
C                                                                       DYNSTF    19
      DIMENSION NAME(2),NAME2(2),VEC1(1000),VEC2(1000),NAME3(2)         DYNSTF    20
      DIMENSION NAME4(2), NAME5(2)                                      DYNSTF    21
      DIMENSION VEC3(1000)                                              DYNSTF    22
C                                                                       DYNSTF    23
      DATA NAME4/4HCOLS,4HTIFF/                                         DYNSTF    24
      DATA NAME5/4HPARS,4HTIFF/                                         DYNSTF    25
      DATA NAME2 /4HDYNS,4HTIFF/                                        DYNSTF    26
      DATA NAME3/4HDYNF,4HLEX /                                         DYNSTF    27
C                                                                       DYNSTF    28
C     SET UP I/O UNITS.                                                 DYNSTF    29
C                                                                       DYNSTF    30
      CALL TIMEB(23,23H FROM DYNSTF, AT START )                         DYNSTF    31
      N1 = ITAPES(21)                                                   DYNSTF    32
      N2 = ITAPES(22)                                                   DYNSTF    33
      N3 = ITAPES(23)                                                   DYNSTF    34
      N4 = ITAPES(28)                                                   DYNSTF    35
      N5 = ITAPES(29)                                                   DYNSTF    36
      N6 = ITAPES(30)                                                   DYNSTF    37
      N7 = ITAPES(32)                                                   DYNSTF    38
      N8 = ITAPES(33)                                                   DYNSTF    39
      N9 = ITAPES(36)                                                   DYNSTF    40
      N10 = ITAPES(50)                                                  DYNSTF    41
C                                                                       DYNSTF    42
C     AORD = ALL NON-ZERO DYNAMIC D.O.F.                                DYNSTF    43
C     ICT = TOTAL NUMBER OF NON-ZERO D.O.F.                             DYNSTF    44
C                                                                       DYNSTF    45
      ICT = 0                                                           DYNSTF    46
      DO 3 I = 1,5                                                      DYNSTF    47
      ID = IDSTR(I)                                                     DYNSTF    48
      IF (ID.EQ.0)  GO TO 3                                             DYNSTF    49
      DO 1 J = 1, 6                                                     DYNSTF    50
      IR = IDYDOF(ID,J)                                                 DYNSTF    51
      IF( IR.EQ.0 )  GO TO 1                                            DYNSTF    52
      ICT = ICT + 1                                                     DYNSTF    53
      AORD(ICT) = FLOAT(IR)                                             DYNSTF    54
    1 CONTINUE                                                          DYNSTF    55
    3 CONTINUE                                                          DYNSTF    56
      NDOFT = ICT                                                       DYNSTF    57
C                                                                       DYNSTF    58
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                  DEFINED        1
   262  NSIZE      INTEGER                          REFS        24    DEFINED       23
   272  NUM        INTEGER                          REFS        56         57       58   DEFINED       55
     0  OUTPUT     INTEGER               F.P.       REFS         3         68       72   DEFINED        1
                                                  I/O REFS      33         38       40        46      126
     0  SCRTCH     INTEGER               F.P.       REFS         3         69       71   DEFINED        1
                                                  I/O REFS      47
     0  STORE      REAL        ARRAY     F.P.       REFS         4        113  DEFINED         1      105       111
        VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS               DEF LINE   REFERENCES
     0  10                         32         28
     0  20                         39         35
    62  30                         42         24
   110  40                         73         70
     0  50                         92         88
   163  70                        106        104
     0  80                        112        109
     0  90                        114        103
     0  99        INACTIVE        100
     0  100                       125         82

LOOPS  LABEL     INDEX      FROM-TO    LENGTH    PROPERTIES
   16  10        I           28 32       23B                EXT REFS  NOT INNER
   26            J           31 31        7B                EXT REFS
   44  20        I           35 39       14B                EXT REFS
   11  100       I           82 125     106B                EXT REFS  NOT INNER
  125  50        J           88 92       23B                EXT REFS  NOT INNER
  135            K           91 91        7B                EXT REFS
  154  90        J          103 114      34B                EXT REFS  NOT INNER
  174  80        K          109 112       2B      INSTACK

STATISTICS
  PROGRAM LENGTH                  331B      217
      52000B CM USED
```

```
      C                                                               TRPOSE     116
      C     UPDATE ROW COUNTER, (ISUMTP) , FOR OUT OF CORE STORAGE.   TRPOSE     117
      C     SWITCH UNITS FOR NEXT PARTITION.                          TRPOSE     118
      C                                                               TRPOSE     119
            ISUMTP = IWRITE                                           TRPOSE     120
            ISAVE = IOLD                                              TRPOSE     121
            IOLD = INEW                                               TRPOSE     122
            INEW = ISAVE                                              TRPOSE     123
            REWIND INEW                                               TRPOSE     124
            REWIND IOLD                                               TRPOSE     125
        100 CONTINUE                                                  TRPOSE     126
            REWIND OUTPUT                                             TRPOSE     127
            RETURN                                                    TRPOSE     128
            END                                                       TRPOSE     129
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  TRPOSE           1           41        127

VARIABLES      SN  TYPE            RELOCATION
     0  BUFFER     REAL       ARRAY     F.P.       REFS         4         38        111    DEFINED          1         31         91
   263  I          INTEGER                         REFS        29         37         83        104    DEFINED         28         35
                                                     82
   275  ICT        INTEGER                         REFS        67    DEFINED         66
   274  ICYCLE     INTEGER                         REFS        66         67         82         83    DEFINED         57         58
   277  INEW       INTEGER                         REFS       121    DEFINED         68         71        122
                                               I/O REFS       113        123
     0  INPUT      INTEGER              F.P.    DEFINED         1   I/O REFS         22         31         91
   300  IOLD       INTEGER                         REFS       120    DEFINED         69         72        121
                                               I/O REFS       105        124
   303  IROWS      INTEGER                         REFS        84         88         90         91    DEFINED         81         83
   310  ISAVE      INTEGER                         REFS       122    DEFINED        120
     0  ISIZE      INTEGER              F.P.       REFS        24         54    DEFINED          1
   301  ISUMBF     INTEGER                         REFS        99        107    DEFINED         79         84
   302  ISUMTP     INTEGER                         REFS        99        105        108    DEFINED         80        119
   276  ITEST      INTEGER                         REFS        70    DEFINED         67
   305  IWRITE     INTEGER                         REFS       113        119    DEFINED         99
   264  I1         INTEGER                         REFS        30         31         90         91    DEFINED         29         89
   265  I2         INTEGER                         REFS        31         91    DEFINED         30         90
   266  J          INTEGER                         REFS        31         38         89    DEFINED         31         38         88
                                                    103
   270  J1         INTEGER                         REFS        38        110        111    DEFINED         36        108        110
   267  J2         INTEGER                         REFS        36         38    DEFINED         34         37
   304  K          INTEGER                         REFS        91        105        111        113    DEFINED         91        105
                                                    109       113
   306  K1         INTEGER                         REFS       109    DEFINED        101        106
   307  K2         INTEGER                         REFS       106        107        109    DEFINED        102        107
   273  LAST       INTEGER                         REFS        58       2*83    DEFINED         56
   271  MAXROW     INTEGER                         REFS        55         56         81    DEFINED         54
     0  NCOLS      INTEGER              F.P.       REFS        23         30         35         54         90        103
                                                DEFINED         1
     0  NROWS      INTEGER              F.P.       REFS        23         28         30         31         37         55         56
```

```
      IF( LAST .NE. 0 ) ICYCLE = NUM + 1
C
C     OUT OF CORE STORAGE FOR EACH OF THE (ICYCLE) PARTITIONS SWITCHES
C     BETWEEN UNITS (OUTPUT) AND (SCRTCH). IF (ICYCLE) IS AN ODD NUMBER,
C     START WITH (OUTPUT). IF (ICYCLE) IS AN EVEN NUMBER, START WITH
C     (SCRTCH). THIS WILL INSURE THAT THE COMPLETE TRANSPOSE IS WRITTEN
C     ONTO UNIT (OUTPUT) DURING THE LAST PARTITION.
C
      ICT = ICYCLE / 2
      ITEST = ICYCLE - 2 * ICT
      INEW = OUTPUT
      IOLD = SCRTCH
      IF( ITEST .NE. 0 ) GO TO 40
      INEW = SCRTCH
      IOLD = OUTPUT
   40 CONTINUE
C
C     THE COUNTER (ISUMBF) GIVES THE TOTAL NUMBER OF PARTITION ROWS
C     CURRENTLY IN THE BUFFER.  (ISUMTP) GIVES THE TOTAL NUMBER OF ROWS
C     WHICH HAVE BEEN WRITTEN TO OUT OF CORE STORAGE.
C
      ISUMBF = 0
      ISUMTP = 0
      IROWS = MAXROW
      DO 100 I = 1,ICYCLE
      IF( I .EQ. ICYCLE .AND. LAST .NE. 0 ) IROWS = LAST
      ISUMBF = IROWS
C
C     FORM TRANSPOSE OF NEXT PARTITION AND STORE IN (BUFFER) BY ROWS.
C
      DO 50 J = 1,IROWS
      I1 = J
      I2 = I1 + ( NCOLS - 1 ) * IROWS
      READ(INPUT) ( BUFFER(K) , K = I1,I2,IROWS )
   50 CONTINUE
C
C     READ FROM UNIT (IOLD) THE INTERMEDIATE TRANSPOSED MATRIX
C     BY ROWS, CONTAINING (ISUMTP) ELEMENTS, AND STORE IN
C     ARRAY (STORE). ADD NEW ELEMENTS FOR THE CURRENT PARTITION FROM
C     ARRAY (BUFFER), AND WRITE THIS NEW ROW WITH (IWRITE) ELEMENTS
C     ONTO NEW UNIT, (INEW).
      IWRITE = ISUMTP + ISUMBF
   99 CONTINUE
      K1 = 0
      K2 = 0
      DO 90 J = 1,NCOLS
      IF( I.EQ. 1 ) GO TO 70
      READ(IOLD) ( STORE(K), K=1,ISUMTP)
   70 K1 = K2 + 1
      K2 = K2 + ISUMBF
      J1 = ISUMTP
      DO 80 K = K1,K2
      J1 = J1 + 1
      STORE(J1) = BUFFER(K)
   80 CONTINUE
      WRITE(INEW) ( STORE(K) , K=1,IWRITE )
   90 CONTINUE
```

```
      SUBROUTINE TRPOSE(INPUT,BUFFER,STORE,NCOLS,NROWS,OUTPUT,SCRTCH,    TRPOSE   2
     1ISIZE)                                                             TRPOSE   3
      INTEGER OUTPUT,SCRTCH                                              TRPOSE   4
      DIMENSION BUFFER(1),STORE(1)                                       TRPOSE   5
C                                                                        TRPOSE   6
C  ****************************************************************      TRPOSE   7
C  *                                                              *      TRPOSE   8
C  *  FORMS THE TRANSPOSE OF A MATRIX, USING OUT-OF-CORE          *      TRPOSE   9
C  *  STORAGE WHERE NECESSARY                                     *      TRPOSE  10
C  *                                                              *      TRPOSE  11
C  ****************************************************************      TRPOSE  12
C                                                                        TRPOSE  13
C***** INPUT  = INPUT UNIT CONTAINING ORIGINAL MATRIX                    TRPOSE  14
C***** BUFFER = BUFFER TO HOLD PART OF MATRIX (SIZE=ISIZE)               TRPOSE  15
C***** STORE  = BUFFER TO HOLD ROW OF TRANSPOSE (SIZE=NROWS)             TRPOSE  16
C***** NCOLS  = NUMBER OF COLUMNS IN ORIGINAL MATRIX                     TRPOSE  17
C***** NROWS  = NUMBER OF ROWS IN ORIGINAL MATRIX                        TRPOSE  18
C***** OUTPUT = OUTPUT UNIT CONTAINING TRANSPOSED MATRIX                 TRPOSE  19
C***** SCRTCH = SCRATCH UNIT                                             TRPOSE  20
C***** ISIZE  = SIZE OF BUFFER                                           TRPOSE  21
C                                                                        TRPOSE  22
      REWIND INPUT                                                       TRPOSE  23
      NSIZE = NROWS * NCOLS                                              TRPOSE  24
      IF( NSIZE .GT. ISIZE ) GO TO 30                                    TRPOSE  25
C                                                                        TRPOSE  26
C     TRANSPOSE OF ORIGINAL MATRIX IS FORMED IN CORE.                    TRPOSE  27
C                                                                        TRPOSE  28
      DO 10 I = 1,NROWS                                                  TRPOSE  29
      I1 = I                                                             TRPOSE  30
      I2 = I1 + ( NCOLS -   ) * NROWS                                    TRPOSE  31
      READ(INPUT) ( BUFFER(J) , J = I1,I2,NROWS )                        TRPOSE  32
   10 CONTINUE                                                           TRPOSE  33
      REWIND OUTPUT                                                      TRPOSE  34
      J2 = 0                                                             TRPOSE  35
      DO 20 I = 1,NCOLS                                                  TRPOSE  36
      J1 = J2 + 1                                                        TRPOSE  37
      J2 = I * NROWS                                                     TRPOSE  38
      WRITE(OUTPUT) ( BUFFER(J) , J = J1,J2 )                            TRPOSE  39
   20 CONTINUE                                                           TRPOSE  40
      REWIND OUTPUT                                                      TRPOSE  41
      RETURN                                                             TRPOSE  42
   30 CONTINUE                                                           TRPOSE  43
C                                                                        TRPOSE  44
C     TRANSPOSE OF ORIGINAL MATRIX IS FORMED USING OUT OF CORE STORAGE.  TRPOSE  45
C                                                                        TRPOSE  46
      REWIND OUTPUT                                                      TRPOSE  47
      REWIND SCRTCH                                                      TRPOSE  48
C                                                                        TRPOSE  49
C     DETERMINE MAXIMUM NUMBER OF ROWS,(MAXROW), WHICH WILL FIT WITHIN   TRPOSE  50
C     CORE STORAGE,(ISIZE).(ICYCLE) GIVES TOTAL NUMBER OF ROW PARTITIONS TRPOSE  51
C     THAT ARE REQUIRED.  THERE ARE (NUM) PARTITIONS CONTAINING (MAXROW) TRPOSE  52
C     ROWS AND ONE PARTITION CONTAINING (LAST) ROWS.                     TRPOSE  53
C                                                                        TRPOSE  54
      MAXROW = ISIZE / NCOLS                                             TRPOSE  55
      NUM = NROWS / MAXROW                                               TRPOSE  56
      LAST = NROWS - NUM * MAXROW                                        TRPOSE  57
      ICYCLE = NUM                                                       TRPOSE  58
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH     PROPERTIES
  566  190      IB          290 331      134B               EXT REFS  NOT INNER
  636  170      MN          308 318       27B               NOT INNER
  650  165      IO          313 316        4B       INSTACK
  713  180      MN          328 330        3B       INSTACK
  743  220      IB          356 368       30B               EXT REFS  NOT INNER
  752  210      IO          364 367       14B               EXT REFS
 1002  230      IO          377 380       14B               EXT REFS

STATISTICS
  PROGRAM LENGTH                 11155B     4717
          52000B CM USED
```

```
STATEMENT LABELS               DEF LINE   REFERENCES
    0  117                        150        148
    0  118                        170        164       166
  433  119                        225        347
    0  120                        243        240
    0  121                        195        186       193
    0  122                        181        180
    0  123                        128        126
    0  124                        129        122
    0  125                        244        234
  345  126                        182        179
    0  128                        206        201       205
  501  130                        245        229       233
    0  135                        254        251
    0  140                        255        250
    0  145                        263        261
  563  150                        285        281
  574  160                        295        292
  620  161                        304        295
  627  163                        305        303
    0  165                        316        313
    0  170                        318        308
  705  175                        327        323
    0  180                        330        328
  717  190                        331        290       326
  725  195                        335        332
  736  200                        351        267
    0  210                        367        364
    0  220                        368        356
    0  230                        380        377
 1026  295                        392         58       382
  334  1118                       171        163
    0  9999        INACTIVE       402

LOOPS  LABEL   INDEX    FROM-TO   LENGTH   PROPERTIES
   75  110     J          72  75     15B              EXT REFS
  126  114     I          90 107     37B              EXT REFS  NOT INNER
  140  113     NPP        99 106     22B              NOT INNER
  150  112     NN        103 105      4B    INSTACK
  173  115     I         115 130     37B              EXT REFS  NOT INNER
  205  124     NPP       122 129     22B              NOT INNER
  215  123     NN        126 128      4B    INSTACK
  265  117     NPP       148 150     20B              EXT REFS  NOT INNER
  272          J         150 150      7B              EXT REFS
  314  118     I         164 170     20B              NOT INNER
  324  118     J         166 170      3B    INSTACK
  340  122     I         180 181      5B              EXT REFS
  352  121     JCNT      186 195     30B              EXT REFS  NOT INNER
  373  121     NPP       193 195      3B    INSTACK
  405  128     I         201 206     15B              EXT REFS  NOT INNER
  413  128     LREAD     205 206      5B              EXT REFS
  441  130     MN        229 245     43B              NOT INNER
  450  125     IB        234 244     31B              NOT INNER
  463  120     IO        240 243      7B    INSTACK
  506  140     NN        250 255     16B              NOT INNER
  513  135     MN        251 254      3B    INSTACK
  531  145     MN        261 263     21B              EXT REFS  NOT INNER
  537          IO        263 263      7B              EXT REFS
```

```
VARIABLES      SN  TYPE            RELOCATION
                                            DEFINED      158       167       184       191
     0  NO          INTEGER           F.P.     REFS       48   DEFINED         1   I/O REFS     398
  1263  NOLD        INTEGER                    REFS      168       169   DEFINED       165       168
  1226  NOUT        INTEGER                    REFS      341   DEFINED        48       342   I/O REFS      49       325
                                                336      373
  1304  NP          INTEGER                    REFS      242       243       310   DEFINED       238       242       305
  1275  NPASS       INTEGER                    REFS      228       356   DEFINED       221       228
  1223  NPM         INTEGER                    REFS       41        51       218   DEFINED        40        43       217
  1247  NPP         INTEGER                    REFS    2*106     2*129       150       195   DEFINED        99       122
                                                148      193
  1274  NREM        INTEGER                    REFS      278       280       281       284       290
                                            DEFINED      216       278
  1264  NREMAN      INTEGER                    REFS      179       180   DEFINED       178
  1251  NROW        INTEGER                    REFS      104       105       127       128       292       323
                                            DEFINED      102       104       125       127       280       283
  1277  NS          INTEGER                    REFS      230       231       232       262       293       300       304
                                                325      365       367       380   DEFINED       227       260       285
                                                293      359       367       378
  1302  NT          INTEGER                    REFS      236       241       244       263       291       294       296
                                                298      299       300       301       304       306       322       325
                                                328      342       365       366       378       379       380
                                            DEFINED      232       236       262       286       291       294       299
                                                301      340       360       366       376       379
  1252  NTBEG       INTEGER                    REFS      116       122   DEFINED       111       116
  1314  NTEMP       INTEGER                    REFS      388   DEFINED       386
  1253  NTEND       INTEGER                    REFS      117       122   DEFINED       112       117
     0  NW          INTEGER           F.P.  DEFINED        1   I/O REFS       29       380
  1307  N1          INTEGER                    REFS      253       254       260       305       359       368
                                            DEFINED      249       253       358
  1305  N2          INTEGER                    REFS      242       314       315       317     2*318       358       360
                                            DEFINED      239       309       315       317       352       368
     0  RHSTAP      INTEGER           F.P.     REFS       18        33   DEFINED         1   I/O REFS      36        37
                                                 73      400
  1250  SUM         REAL                       REFS      105       106       128       129       243       244       314
                                                318  DEFINED       101       105       124       128       237       243
                                                312      314
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
        SQRT       REAL       1 LIBRARY     141

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE   REFERENCES
        MAXO       INTEGER    0  INTRIN                  41
        MINO       INTEGER    0  INTRIN                  39

STATEMENT LABELS                  DEF LINE   REFERENCES
     0  1             INACTIVE       26
    20  5                            36         33
    24  6                            38         35
    57  109                          60        391
     0  110                          75         72
   117  111                          82        137
     0  112                         105        103
     0  113                         106         99
     0  114                         107         90
     0  115                         130        115
   241  116                         139        108
```

```
      DO 3 I= 1,NROW
CCDC
      SUM = 0.0
CCDC
CIBM
C     SUM = 0.DO
CIBM
    3 C(I)= SOSCAP(A,B,SUM,MM,NROW,1,I,1)
    2 CALL RNRW(IOC,C(1),NROW)
      IRET= 1
      REWIND INA
      RETURN
C
C IF NO COLUMNS WILL FIT, FLAG  ERROR
C
   10 IF(IP1.GE.1 .AND. IP2.GE.1) GO TO 20
      IRET=-1
      RETURN
C
C ONLY P COLUMNS WILL FIT AT A TIME
C
   20 CONTINUE
      NROFA = 0
      NROFB = 0
C
C DO IP2 COLUMNS OF B REMAIN ?
C IF SO, READ THEM INTO CORE.
C OTHERWISE, READ WHAT IS LEFT.
C
   21 CONTINUE
      ILEFT= NCOL - NROFB
      IB = MINO(IP,ILEFT)
      DO 22 I= 1,IB
      II= (I-1)*MM + 1
   22 CALL RNRW(-INB,B(II),MM)
C
C ZERO OUT C TO HOLD
C NEXT PORTION OF A*B
C
      NRIB= NROW*IB
      DO 23 I= 1,NRIB
   23 C(I)= 0.
C
C DO IP1 COLUMNS OF A REMAIN?
C IF SO, READ THEM INTO CORE.
C OTHERWISE, READ WHAT IS LEFT.
C
   31 CONTINUE
      ILEFT= MM - NROFA
      IA = MINO(IP,ILEFT)
      DO 32 I= 1,IA
      II= (I-1)*NROW + 1
   32 CALL RNRW(-INA,A(II),NROW)
C
C ACCUMULATE A(I,K)*B(K,J)
C INTO C FOR I= ALL ROWS,
C J= IB COLUMNS, AND K= [illegible]
```

```
      C                                                           TRIXY    116
            DO 41 J= 1,IB                                         TRIXY    117
            DO 41 I= 1,NROW                                       TRIXY    118
            IJ= I + (J-1)*NROW                                    TRIXY    119
            DO 42 K= 1,IA                                         TRIXY    120
            KJ= (J-1)*MM + NROFA + K                              TRIXY    121
            IK= I + (K-1)*NROW                                    TRIXY    122
         42 C(IJ)= A(IK)*B(KJ) + C(IJ)                            TRIXY    123
         41 CONTINUE                                              TRIXY    124
            NROFA= NROFA + IA                                     TRIXY    125
      C                                                           TRIXY    126
      C IF ANY COLUMNS OF A ARE LEFT,                             TRIXY    127
      C GO TO BACK AND GET THEM.                                  TRIXY    128
      C OTHERWISE REWIND INA, WRITE C,                            TRIXY    129
      C AND GO BACK FOR NEXT COLUMNS                              TRIXY    130
      C OF B, IF ANY.                                             TRIXY    131
      C                                                           TRIXY    132
            IF(NROFA.LT.MM) GO TO 31                              TRIXY    133
            REWIND INA                                            TRIXY    134
            NROFA= 0                                              TRIXY    135
            DO 24 I= 1,IB                                         TRIXY    136
            II= (I-1)*NROW + 1                                    TRIXY    137
         24 CALL RNRW(IOC,C(II),NROW)                             TRIXY    138
            NROFB= NROFB + IB                                     TRIXY    139
            IF(NROFB.LT.NCOL) GO TO 21                            TRIXY    140
            RETURN                                                TRIXY    141
            END                                                   TRIXY    142
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  TRIXY          1          69        75        140

VARIABLES      SN  TYPE          RELOCATION
   O  A            REAL      ARRAY    F.P.     REFS       28       48       65       110       122
                                             DEFINED       1
   O  B            REAL      ARRAY    F.P.     RFFS       28       57       65        92       122
                                             DEFINED       1
   O  C            REAL      ARRAY    F.P.     REFS       28       66      122       137     DEFINED     1      65
                                                 99      122
 274  I            INTEGER                     REFS       47     2*65       91        99       109     118     121
                                                136   DEFINED       46       58        90        98     108     117
                                                135
 305  IA           INTEGER                     REFS      108      119      124   DEFINED       107
 303  IB           INTEGER                     REFS       90       97      116       135       138
                                             DEFINED      89
 275  II           INTEGER                     REFS       48       92      110       137     DEFINED    47      91
                                                109      136
 306  IJ           INTEGER                     REFS    2*122  DEFINED      118
 311  IK           INTEGER                     REFS      122  DEFINED      121
 302  ILEFT        INTEGER                     REFS       89      107  DEFINED        88       106
   O  INA          INTEGER            F.P.     REFS       48      110  DEFINED         1    I/O REFS    32      68
                                                133
```

```
VARIABLES       SN  TYPE              RELOCATION
     0  INB         INTEGER             F.P.       REFS       57       92   DEFINED       1
     0  IOC         INTEGER             F.P.       REFS       66      137   DEFINED       1
   273  IP          INTEGER                        REFS       89      107   DEFINED      41
   271  IP1         INTEGER                        REFS       41       42        73   DEFINED       39
   272  IP2         INTEGER                        REFS       41       73   DEFINED      40
     0  IRET        INTEGER             F.P.    DEFINED        1       33        67      74
   276  J           INTEGER                        REFS      118      120   DEFINED      56      116
   307  K           INTEGER                        REFS      120      121   DEFINED     119
   310  KJ          INTEGER                        REFS      122  DEFINED       120
     0  LENGTH      INTEGER             F.P.       REFS     3*28       39        40   DEFINED        1
     0  MM          INTEGER             F.P.       REFS       40       42        46      57       65       91       92
                                                    106      120      132   DEFINED       1
     0  NCOL        INTEGER             F.P.       REFS       56       88       139   DEFINED        1
   304  NRIB        INTEGER                        REFS       98  DEFINED        97
   300  NROFA       INTEGER                        REFS      106      120       124     132  DEFINED       80      124
                                                    134
   301  NROFB       INTEGER                        REFS       88      138       139   DEFINED       81      138
     0  NROW        INTEGER             F.P.       REFS       39       47        48      58       65       66       97
                                                    109      110      117       118     121      136      137
                                                DEFINED        1
   277  SUM         REAL                           REFS       65  DEFINED        60
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE     ARGS         REFERENCES
        RNRW                   3                48       57       66       92      110      137
        SOSCAP      REAL       8                65

INLINE FUNCTIONS    TYPE     ARGS        DEF LINE   REFERENCES
        MINO        INTEGER    0  INTRIN                 41       89      107

STATEMENT LABELS                   DEF LINE    REFERENCES
     0  1                                49         46
     0  2                                66         56
     0  3                                65         58
    74  10                               73         42
   101  20                               79         73
   103  21                               87        139
     0  22                               92         90
     0  23                               99         98
     0  24                              137        135
   134  31                              135        132
     0  32                              110        108
     0  41                              123        116      117
     0  42                              122        119
     0  99              INACTIVE         33

LOOPS   LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   24   1         I          46  49        13B                  EXT REFS
   40   2         J          56  66        30B                  EXT REFS  NOT INNER
   46   3         I          58  65        13B                  EXT REFS
  111   22        I          90  92        13B                  EXT REFS
  131   23        I          98  99         2B         INSTACK
  142   32        I         108 110        13B                  EXT REFS
  156   41        J         116 123        33B                  NOT INNER
  157   41        I         117 123        27B                  NOT INNER
  174   42        K         119 122         7B         INSTACK
  220   24        I         135 137        13B                  EXT REFS
```

```
STATISTICS
  PROGRAM LENGTH              360B     240
        52000B CM USED
```

```
      SUBROUTINE UPDATE( IUNIT, IUPR, NCYC )                           UPDATE   2
      COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)   UPDATE   3
     A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)          UPDATE   4
     B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)               UPDATE   5
     C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)               UPDATE   6
     D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                       UPDATE   7
     E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                          UPDATE   8
     F      ,STRFDO(5,6),STRFDN(5,6)                                   UPDATE   9
      COMMON/ INVERT / INVERT,IUA2,IFLEX,AORD(30),IPERM(30),NSTOR(30,2) UPDATE  10
     A,IPREV,NDOFT                                                     UPDATE  11
C                                                                      UPDATE  12
C     THIS SUBROUTINE REPLACES THE DIAGONAL ELEMENTS                   UPDATE  13
C     OF THE PYLON-PYLON PARTITION OF THE DYNAMIC FLEXIBILITY          UPDATE  14
C     MATRIX WITH THE NEW VALUES FOUND IN ARRAY STRFN.                 UPDATE  15
C                                                                      UPDATE  16
      DIMENSION BUF(220), NAME1(2), NAME2(2)                           UPDATE  17
      DIMENSION BUF2(220), DIF(220)                                    UPDATE  18
      DATA NAME2 /4HDYNF,4HLEX /                                       UPDATE  19
C                                                                      UPDATE  20
C     DYNAMIC FLEXIBILITY MATRIX IS ON UNIT IUNIT                      UPDATE  21
C     FROM PREVIOUS CYCLE. UPDATE AND PUT ON UNIT IFLEX - IOLD.        UPDATE  22
C                                                                      UPDATE  23
CIBM                                                                   UPDATE  24
C     IUA = 14                                                         UPDATE  25
C     IUA3 = 8                                                         UPDATE  26
CIBM                                                                   UPDATE  27
C                                                                      UPDATE  28
CCDC                                                                   UPDATE  29
      IUA = 11                                                         UPDATE  30
      IUA3 = 5                                                         UPDATE  31
CCDC                                                                   UPDATE  32
C                                                                      UPDATE  33
      IF( NCYC .GT. 0 ) GO TO 5                                        UPDATE  34
      IOLD = IUA2                                                      UPDATE  35
      IUNIT = IUA                                                      UPDATE  36
      IUA2 = IUNIT                                                     UPDATE  37
      GO TO 90                                                         UPDATE  38
    5 CONTINUE                                                         UPDATE  39
      IOLD = IUNIT                                                     UPDATE  40
C                                                                      UPDATE  41
CIBM                                                                   UPDATE  42
C     IUNIT = 29 - IOLD                                                UPDATE  43
CIBM                                                                   UPDATE  44
C                                                                      UPDATE  45
CCDC                                                                   UPDATE  46
      IUNIT = 23 - IOLD                                                UPDATE  47
CCDC                                                                   UPDATE  48
C                                                                      UPDATE  49
      IUA2 = IUNIT                                                     UPDATE  50
C                                                                      UPDATE  51
C                                                                      UPDATE  52
C     LOCATE ROW OF DYNAMIC FLEXIBILITY MATRIX                         UPDATE  53
C      WHICH CORRESPONDS TO A DY.D.O.F. IN ARRAY AORD.                 UPDATE  54
C                                                                      UPDATE  55
C     ICHK = INDICATES CURRENT ROW OF D.F.M.                           UPDATE  56
C     INUM = INDICATES CURRENT DY.D.O.F.                               UPDATE  57
C                                                                      UPDATE  58
```

```
      CALL GEDLAB(8HUPDATE01,IOLD,NAME1,1,KROW,KCOL)                    UPDATE    59
      CALL PUDLAB(8HUPDATE02,IUNIT,NAME2,1,KROW,KCOL)                   UPDATE    60
C     WRITE(6,500)                                                      UPDATE    61
C 500 FORMAT(1H1,5X,'****   D.F.M.    ****')                            UPDATE    62
C 501 FORMAT(1H ,5X,'ROW NO. ',I3,/)                                    UPDATE    63
C 502 FORMAT(1X,1P10E12.4)                                              UPDATE    64
      INUM = 1                                                          UPDATE    65
      ICHK = 0                                                          UPDATE    66
   20 ICHK = ICHK + 1                                                   UPDATE    67
      IF( ICHK.GT.KROW) GO TO 90                                        UPDATE    68
      CALL GETROW(IOLD,1,BUF,KCOL)                                      UPDATE    69
      IF( INUM.GT.NDOFT ) GO TO 30                                      UPDATE    70
      GO TO 50                                                          UPDATE    71
   30 CALL PUTROW( IUNIT,-1,BUF,KCOL )                                  UPDATE    72
C     WRITE(6,501) ICHK                                                 UPDATE    73
C     WRITE(6,502) ( BUF(J), J = 1, KCOL )                              UPDATE    74
      GO TO 20                                                          UPDATE    75
   40 CONTINUE                                                          UPDATE    76
C                                                                       UPDATE    77
C     REPLACE THE ELEMENT (ID,ID) OF D.F.M.WITH                         UPDATE    78
C     NEW VALUE FOUND IN STRFN(ISTORE,JC).                              UPDATE    79
C                                                                       UPDATE    80
      BUF(ID) = STRFN( ISTORE, JC )                                     UPDATE    81
      CALL PUTROW( IUNIT, -1, BUF, KCOL )                               UPDATE    82
C     WRITE(6,501) ICHK                                                 UPDATE    83
C     WRITE(6,502) ( BUF(J), J = 1, KCOL )                              UPDATE    84
      GO TO 20                                                          UPDATE    85
C                                                                       UPDATE    86
C     DETERMINE IF ROW ICHK OF D.F.M. CORRESPONDS                       UPDATE    87
C     TO A PYLON D.O.F.                                                 UPDATE    88
C                                                                       UPDATE    89
   50 CONTINUE                                                          UPDATE    90
      IP = IPERM( INUM )                                                UPDATE    91
      ID = IFIX( AORD(IP))                                              UPDATE    92
      IF( ICHK .NE. ID ) GO TO 30                                       UPDATE    93
      ISTORE = NSTOR(INUM,1)                                            UPDATE    94
      JC = NSTOR(INUM,2)                                                UPDATE    95
      INUM = INUM + 1                                                   UPDATE    96
      GO TO 40                                                          UPDATE    97
   90 CONTINUE                                                          UPDATE    98
      CALL DCLOSE(IOLD)                                                 UPDATE    99
      CALL DCLOSE(IUNIT)                                                UPDATE   100
      WRITE(6,600)                                                      UPDATE   101
  600 FORMAT(1H1,5X,41H****   EQUIVALENCE CHECK FOR D.F.M.    ***)      UPDATE   102
      CALL GEDLAB (8HUPDATE08,IUA3,NAME1,1,KR1,KC1)                     UPDATE   103
      CALL GEDLAB (8HUPDATE15,IUNIT,NAME1,1,KR2,KC2)                    UPDATE   104
      DO 530 I = 1, KR1                                                 UPDATE   105
      CALL GETROW (IUA3,1,BUF,KC1)                                      UPDATE   106
      CALL GETROW(IUNIT,1,BUF2,KC2)                                     UPDATE   107
      IC = 0                                                            UPDATE   108
      DO 510 J = 1, KC1                                                 UPDATE   109
      DIF(J) = 0.0                                                      UPDATE   110
      DIF(J) = BUF2(J) - BUF(J)                                         UPDATE   111
      IF( DIF(J) .EQ. 0.0 ) GO TO 510                                   UPDATE   112
      IC = IC + 1                                                       UPDATE   113
  510 CONTINUE                                                          UPDATE   114
      IF( IC .EQ. 0 ) GO TO 530                                         UPDATE   115
```

```
  115              DO 520 J = 1, KC1                                                       UPDATE     116
                   A = DIF(J)                                                              UPDATE     117
                   IF( A .EQ. 0.0 ) GO TO 520                                              UPDATE     118
                   WRITE (6,602) I,J,A                                                     UPDATE     119
               602 FORMAT (1H ,5X,8HROW NO. ,I4,5X,11HCOLUMN NO. ,I4,5X,1PE20.8)           UPDATE     120
  120          520 CONTINUE                                                                UPDATE     121
               530 CONTINUE                                                                UPDATE     122
                   CALL DCLOSE (IUA3)                                                      UPDATE     123
                   CALL DCLOSE (IUNIT)                                                     UPDATE     124
                   RETURN                                                                  UPDATE     125
  125              END                                                                     UPDATE     126
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  UPDATE         1         124

VARIABLES      SN  TYPE            RELOCATION
  303  A           REAL                             REFS       117      118   DEFINED     116
    3  AORD        REAL       ARRAY    INVERT       REFS         9       91
  304  BUF         REAL       ARRAY                 REFS        16       68       71       81      105      110
                                                 DEFINED        80
  644  BUF2        REAL       ARRAY                 REFS        17      106      110
 1200  DIF         REAL       ARRAY                 REFS        17      111      116  DEFINED      109      110
  300  I           INTEGER                          REFS       118  DEFINED      104
  301  IC          INTEGER                          REFS       112      114  DEFINED      107      112
  267  ICHK        INTEGER                          REFS        66       67       92  DEFINED       65       66
  270  ID          INTEGER                          REFS        80       92  DEFINED       91
   76  IDSTR       INTEGER    ARRAY    STORES       REFS         2
   40  IDYDOF      INTEGER    ARRAY    STORES       REFS         2
    2  IFLEX       INTEGER             INVERT       REFS         9
  266  INUM        INTEGER                          REFS        69       90       93       94       95
                                                 DEFINED        64       95
    0  INVERT      INTEGER             INVERT       REFS         9
  263  IOLD        INTEGER                          REFS        46       58       68       98  DEFINED       34       39
  273  IP          INTEGER                          REFS        91  DEFINED       90
   41  IPERM       INTEGER    ARRAY    INVERT       REFS         9       90
  173  IPREV       INTEGER             INVERT       REFS         9
    2  ISTDOF      INTEGER    ARRAY    STORES       REFS         2
  271  ISTORE      INTEGER                          REFS        80  DEFINED       93
  261  IUA         INTEGER                          REFS        35  DEFINED       29
    1  IUA2        INTEGER             INVERT       REFS         9       34  DEFINED       36       49
  262  IUA3        INTEGER                          REFS       102      105      122  DEFINED       30
    0  IUNIT       INTEGER              F.P.        REFS        36       39       49       59       71       81       99
                                                     103       106      123  DEFINED        1       35       46
    0  IUPR        INTEGER   *UNUSED    F.P.     DEFINED         1
  302  J           INTEGER                          REFS       109    3*110      111      116      118
                                                 DEFINED       108      115
  272  JC          INTEGER                          REFS        80  DEFINED       94
  265  KCOL        INTEGER                          REFS        58       59       68       71       81
    1  KCONST      INTEGER             STORES       REFS         2
  275  KC1         INTEGER                          REFS       102      105      108      115
  277  KC2         INTEGER                          REFS       103      106
```

```
VARIABLES      SN  TYPE          RELOCATION
  264  KROW        INTEGER                            REFS          58        59        67
  274  KR1         INTEGER                            REFS         102       104
  276  KR2       * INTEGER                            REFS         103
  640  NAME1       INTEGER      ARRAY                 REFS          16        58       102        103
  642  NAME2       INTEGER      ARRAY                 REFS          16        59   DEFINED         18
    O  NCYC        INTEGER               F.P.         REFS          33   DEFINED         1
  174  NDOFT       INTEGER               INVERT       REFS           9        69
   77  NSTOR       INTEGER      ARRAY    INVERT       REFS           9        93        94
    O  NUMSTR      INTEGER               STORES       REFS           2
  362  SCALE       REAL         ARRAY    STORES       REFS           2
  653  STRFDN      REAL         ARRAY    STORES       REFS           2
  615  STRFDO      REAL         ARRAY    STORES       REFS           2
  463  STRFI       REAL         ARRAY    STORES       REFS           2
  557  STRFN       REAL         ARRAY    STORES       REFS           2        80
  521  STRFO       REAL         ARRAY    STORES       REFS           2
  305  STRIDN      REAL         ARRAY    STORES       REFS           2
  266  STRIDO      REAL         ARRAY    STORES       REFS           2
  122  STRII       REAL         ARRAY    STORES       REFS           2
  160  STRIN       REAL         ARRAY    STORES       REFS           2
  141  STRIO       REAL         ARRAY    STORES       REFS           2
  343  STRRDN      REAL         ARRAY    STORES       REFS           2
  324  STRRDO      REAL         ARRAY    STORES       REFS           2
  177  STRRI       REAL         ARRAY    STORES       REFS           2
  235  STRRN       REAL         ARRAY    STORES       REFS           2
  216  STRRO       REAL         ARRAY    STORES       REFS           2
  261  STRWDN      REAL         ARRAY    STORES       REFS           2
  254  STRWDO      REAL         ARRAY    STORES       REFS           2
  103  STRWI       REAL         ARRAY    STORES       REFS           2
  115  STRWN       REAL         ARRAY    STORES       REFS           2
  110  STRWO       REAL         ARRAY    STORES       REFS           2

FILE NAMES        MODE
       TAPE6      FMT                      WRITES      100         118

EXTERNALS            TYPE    ARGS        REFERENCES
       DCLOSE                  1              98        99         122        123
       GEDLAB                  6              58       102         103
       GETROW                  4              68       105         106
       PUDLAB                  6              59
       PUTROW                  4              71        81

INLINE FUNCTIONS     TYPE    ARGS         DEF LINE  REFERENCES
       IFIX        INTEGER     1  INTRIN                91

STATEMENT LABELS                DEF LINE    REFERENCES
   15  5                          38          33
   27  20                         66          74        84
   37  30                         71          69        92
   44  40                         75          96
   55  50                         89          70
   66  90                         97          37        67
  120  510                       113         108       111
  130  520                       120         115       117
  133  530                       121         104       114
  235  600       FMT             101         100
  252  602       FMT             119         118
```

```
LOOPS  LABEL   INDEX    FROM-TO    LENGTH    PROPERTIES
  103  530     I        104 121      33B              EXT REFS  NOT INNER
  114  510     J        108 113       5B      INSTACK
  124  520     J        115 120       7B              EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
      STORES      457             0 NUMSTR (1)            1 KCONST (1)            2 ISTDOF (30)
                                 32 IDYDOF (30)          62 IDSTR  (5)           67 STRWI  (5)
                                 72 STRWO  (5)           77 STRWN  (5)           82 STRII  (15)
                                 97 STRIO  (15)         112 STRIN  (15)         127 STRRI  (15)
                                142 STRRO  (15)         157 STRRN  (15)         172 STRWDO (5)
                                177 STRWDN (5)          182 STRIDO (15)         197 STRIDN (15)
                                212 STRRDO (15)         227 STRRDN (15)         242 SCALE  (65)
                                307 STRFI  (30)         337 STRFO  (30)         367 STRFN  (30)
                                397 STRFDO (30)         427 STRFDN (30)
      INVERT      125             0 INVERT (1)            1 IUA2   (1)            2 IFLEX  (1)
                                  3 AORD   (30)          33 IPERM  (30)          63 NSTOR  (60)
                                123 IPREV  (1)          124 NDOFT  (1)

STATISTICS
  PROGRAM LENGTH                1546B      870
  CM LABELED COMMON LENGTH      1106B      582
        52000B CM USED
```

```
      1              SUBROUTINE CHANGE( DELTA )                                          CHANGE        2
                     COMMON/ STORES /NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)      CHANGE        3
                    A      ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)             CHANGE        4
                    B      ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)                  CHANGE        5
      5             C      ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)                  CHANGE        6
                    D      ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                          CHANGE        7
                    E      ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                             CHANGE        8
                    F      ,STRFDO(5,6),STRFDN(5,6)                                      CHANGE        9
                     COMMON/ INVERT / INVERT,IUA2,IFLEX,AORD(30),IPERM(30),NSTOR(30,2)   CHANGE       10
     10             A,IPREV,NDOFT                                                        CHANGE       11
                     DIMENSION DELTA(30                                                  CHANGE       12
                     DO 10 I = 1, NDOFT                                                  CHANGE       13
                     I1 = NSTOR(I,1)                                                     CHANGE       14
                     I2 = NSTOR(I,2)                                                     CHANGE       15
     15              DELTA(I) = STRFN(I1,I2) - STRFI(I1,I2)                              CHANGE       16
                  10 CONTINUE                                                            CHANGE       17
                     RETURN                                                              CHANGE       18
                     END                                                                 CHANGE       19
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  CHANGE          1            17

VARIABLES       SN  TYPE              RELOCATION
     3  AORD        REAL        ARRAY    INVERT       REFS         9
     0  DELTA       REAL        ARRAY     F.P.        REFS        11     DEFINED        1        15
    21  I           INTEGER                           REFS        13        14         15    DEFINED       12
    76  IDSTR       INTEGER     ARRAY    STORES       REFS         2
    40  IDYDOF      INTEGER     ARRAY    STORES       REFS         2
     2  IFLEX       INTEGER              INVERT       REFS         9
     0  INVERT      INTEGER              INVERT       REFS         9
    41  IPERM       INTEGER     ARRAY    INVERT       REFS         9
   173  IPREV       INTEGER              INVERT       REFS         9
     2  ISTDOF      INTEGER     ARRAY    STORES       REFS         2
     1  IUA2        INTEGER              INVERT       REFS         9
    22  I1          INTEGER                           REFS      2*15     DEFINED       13
    23  I2          INTEGER                           REFS      2*15     DEFINED       14
     1  KCONST      INTEGER              STORES       REFS         2
   174  NDOFT       INTEGER              INVERT       REFS         9        12
    77  NSTOR       INTEGER     ARRAY    INVERT       REFS         9        13         14
     0  NUMSTR      INTEGER              STORES       REFS         2
   362  SCALE       REAL        ARRAY    STORES       REFS         2
   653  STRFDN      REAL        ARRAY    STORES       REFS         2
   615  STRFDO      REAL        ARRAY    STORES       REFS         2
   463  STRFI       REAL        ARRAY    STORES       REFS         2        15
   557  STRFN       REAL        ARRAY    STORES       REFS         2        15
   521  STRFO       REAL        ARRAY    STORES       REFS         2
   305  STRIDN      REAL        ARRAY    STORES       REFS         2
   266  STRIDO      REAL        ARRAY    STORES       REFS         2
   122  STRII       REAL        ARRAY    STORES       REFS         2
   160  STRIN       REAL        ARRAY    STORES       REFS         2
   141  STRIO       REAL        ARRAY    STORES       REFS         2
```

```
VARIABLES       SN  TYPE           RELOCATION
  343  STRRDN      REAL        ARRAY    STORES        REFS          2
  324  STRRDO      REAL        ARRAY    STORES        REFS          2
  177  STRRI       REAL        ARRAY    STORES        REFS          2
  235  STRRN       REAL        ARRAY    STORES        REFS          2
  216  STRRO       REAL        ARRAY    STORES        REFS          2
  261  STRWDN      REAL        ARRAY    STORES        REFS          2
  254  STRWDO      REAL        ARRAY    STORES        REFS          2
  103  STRWI       REAL        ARRAY    STORES        REFS          2
  115  STRWN       REAL        ARRAY    STORES        REFS          2
  110  STRWO       REAL        ARRAY    STORES        REFS          2

STATEMENT LABELS               DEF LINE   REFERENCES
    0  10                          16         12

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   11  10        I          12  16         7B      INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       STORES       457                0 NUMSTR (1)               1 KCONST (1)               2 ISTDOF (30)
                                      32 IDYDOF (30)             62 IDSTR  (5)              67 STRWI  (5)
                                      72 STRWO  (5)              77 STRWN  (5)              82 STRII  (15)
                                      97 STRIO  (15)            112 STRIN  (15)            127 STRRI  (15)
                                     142 STRRO  (15)            157 STRRN  (15)            172 STRWDO (5)
                                     177 STRWDN (5)             182 STRIDO (15)            197 STRIDN (15)
                                     212 STRRDO (15)            227 STRRDN (15)            242 SCALE  (65)
                                     307 STRFI  (30)            337 STRFO  (30)            367 STRFN  (30)
                                     397 STRFDO (30)            427 STRFDN (30)
       INVERT       125                0 INVERT (1)               1 IUA2   (1)               2 IFLEX  (1)
                                       3 AORD   (30)             33 IPERM  (30)             63 NSTOR  (60)
                                     123 IPREV  (1)             124 NDOFT  (1)

STATISTICS
  PROGRAM LENGTH                  24B       20
  CM LABELED COMMON LENGTH      1106B      582
          52000B CM USED
```

```
              SUBROUTINE MOVE(NU,SV,IS,TV,IT)                     MOVE      2
      C                                                           MOVE      3
      C***                                                        MOVE      4
      C                                                           MOVE      5
      C       CDC VERSION ONLY                                    MOVE      6
      C                                                           MOVE      7
      C***                                                        MOVE      8
      C                                                           MOVE      9
              DIMENSION SV(1), TV(1)                              MOVE     10
              NUM=NU                                              MOVE     11
              ISPTR=IS                                            MOVE     12
              ITPTR=IT                                            MOVE     13
           10 CONTINUE                                            MOVE     14
              IMASK=77B                                           MOVE     15
              CALL WDCHAR(ISPTR,IWD,ISHIFT)                       MOVE     16
              STEMP=SV(IWD)                                       MOVE     17
              ISCHAR=SHIFT(STEMP,-ISHIFT)                         MOVE     18
              ISCHAR =ISCHAR.AND.IMASK                            MOVE     19
              CALL WDCHAR(ITPTR,IWD,ISHIFT)                       MOVE     20
              ISCHAR=SHIFT(ISCHAR,ISHIFT)                         MOVE     21
              IMASK=SHIFT(IMASK,ISHI--)                           MOVE     22
              ISCHAR =ISCHAR.AND.IMASK                            MOVE     23
              TV(IWD)=TV(IWD).AND.(.NOT.IMASK)                    MOVE     24
              TV(IWD)=TV(IWD).OR.ISCHAR                           MOVE     25
              ISPTR=ISPTR+1                                       MOVE     26
              ITPTR=ITPTR+1                                       MOVE     27
              NUM=NUM-1                                           MOVE     28
              IF(NUM.GT.0) GO TO 10                               MOVE     29
              RETURN                                              MOVE     30
              END                                                 MOVE     31
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  MOVE           1          29

VARIABLES     SN  TYPE            RELOCATION
   53  IMASK      INTEGER                        REFS      18        21        22        23   DEFINED        14        21
    0  IS         INTEGER               F.P.     REFS      11   DEFINED         1
   57  ISCHAR     INTEGER                        REFS      18        20        22        24   DEFINED        17        18
                                                   20      22
   55  ISHIFT     INTEGER                        REFS      15        17        19        20        21
   51  ISPTR      INTEGER                        REFS      15        25   DEFINED        11        25
    0  IT         INTEGER               F.P.     REFS      12   DEFINED         1
   52  ITPTR      INTEGER                        REFS      19        26   DEFINED        12        26
   54  IWD        INTEGER                        REFS      15        16        19      2*23      2*24
    0  NU         INTEGER               F.P.     REFS      10   DEFINED         1
   50  NUM        INTEGER                        REFS      27        28   DEFINED        10        27
   56  STEMP      REAL                           REFS      17   DEFINED        16
    0  SV         REAL       ARRAY      F.P.     REFS       9        16   DEFINED         1
    0  TV         REAL       ARRAY      F.P.     REFS       9        23        24   DEFINED         1        23        24
```

```
      WDCHAR              3             15        19

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
      SHIFT       NO TYPE    2  INTRIN                17        20        21

STATEMENT LABELS                DEF LINE   REFERENCES
   12  10                          13         28

STATISTICS
  PROGRAM LENGTH                   60B        48
          52000B CM USED
```

```
                    SUBROUTINE WDCHAR(IPTR,IWD,ISHIFT)                             WDCHAR     2
                    ICHAR=MOD(IPTR,10)                                             WDCHAR     3
                    IF(ICHAR.EQ.0) GO TO 10                                        WDCHAR     4
                       IWD=(IPTR/10) + 1                                           WDCHAR     5
                       GO TO 20                                                    WDCHAR     6
              10    CONTINUE                                                       WDCHAR     7
                       IWD=IPTR/10                                                 WDCHAR     8
                        ICHAR=10                                                   WDCHAR     9
              20    CONTINUE                                                       WDCHAR    10
                    ISHIFT=(10-ICHAR)*6                                            WDCHAR    11
                    RETURN                                                         WDCHAR    12
                    END                                                            WDCHAR    13


        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  WDCHAR          1          11

VARIABLES      SN  TYPE            RELOCATION
   23  ICHAR      INTEGER                            REFS          3         11    DEFINED        2        8
    0  IPTR       INTEGER                F.P.        REFS          2          4          7    DEFINED       1
    0  ISHIFT     INTEGER                F.P.      DEFINED         1         10
    0  IWD        INTEGER                F.P.      DEFINED         1          4          7

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       MOD        INTEGER     2   INTRIN                2

STATEMENT LABELS              DEF LINE    REFERENCES
   13   10                        6           3
   17   20                        9           5

STATISTICS
  PROGRAM LENGTH                 24B        20
        52000B CM USED
```

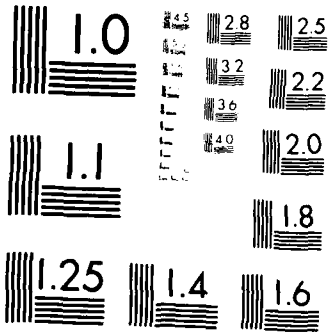
AD-A152 271 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-2 8/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL

END

FILMED

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

```
      SUBROUTINE REDMOD (NLEFT)                                         REDMOD     2
C                                                                       REDMOD     3
C     REDUCTION IN NUMBER OF MODES  SED IN FLUTTER ANALYSIS             REDMOD     4
C     BASED ON RATIOS OF ON-DIAGONAL GENERALIZED FORCES TO              REDMOD     5
C     GENERALIZED MASSES                                                REDMOD     6
C                                                                       REDMOD     7
C     TEST MADE AT 0.75, 1.0, AND 1.25 TIMES NOMINAL VELOCITY           REDMOD     8
C                                                                       REDMOD     9
      DIMENSION LC(40)                                                  REDMOD    10
      DIMENSION WW(40,40), OMM(40), OMG(40), NIND(40)                   REDMOD    11
      DIMENSION X(15), QQ(15,2), QTST(2,2)                              REDMOD    12
      DIMENSION XK(15), QQK(15,2)                                       REDMOD    13
      DIMENSION VQDW(3)                                                 REDMOD    14
      DIMENSION ITAPES(50)                                              REDMOD    15
C                                                                       REDMOD    16
      COMPLEX   Q(40,40), DETAD(40,40), GK(40,40)                       REDMOD    17
      COMPLEX   CQTST                                                   REDMOD    18
C                                                                       REDMOD    19
      COMMON /KZERO/  KZ, XK                                            REDMOD    20
      COMMON /QELIM/  QQDWW, VQQDWW, LC38                               REDMOD    21
      COMMON /MODD/   Q, DETAD, WW, OMM, NC                             REDMOD    22
      COMMON /FLEXT/  GK, OMG, RHO, VB                                  REDMOD    23
      COMMON /FITR/   NOMI, NIND                                        REDMOD    24
      COMMON /CTAPES/ ITAPES                                            REDMOD    25
      COMMON /COMA/   LC, BR                                            REDMOD    26
C                                                                       REDMOD    27
      DATA  DELYES /4HYES /                                             REDMOD    28
      DATA  DELNO  /4H NO /                                             REDMOD    29
C                                                                       REDMOD    30
      ITAPEW = ITAPES(6)                                                REDMOD    31
      ITAPE = ITAPES(50)                                                REDMOD    32
      NQ = LC(2)                                                        REDMOD    33
      NOMI = 0                                                          REDMOD    34
C                                                                       REDMOD    35
      REWIND ITAPE                                                      REDMOD    36
      READ (ITAPE) NX, NF, LL, X, NQR                                   REDMOD    37
      DO 10 K1=1,NX                                                     REDMOD    38
      K2 = NX - K1 + 1                                                  REDMOD    39
      XK(K2) = 1.0 / X(K1)                                              REDMOD    40
   10 CONTINUE                                                          REDMOD    41
      KZ = 1                                                            REDMOD    42
C                                                                       REDMOD    43
      VC = 0.5                                                          REDMOD    44
      DO 20 I=1,3                                                       REDMOD    45
      VC = VC + 0.25                                                    REDMOD    46
      VQDW(I) = VC * VQQDWW                                             REDMOD    47
   20 CONTINUE                                                          REDMOD    48
      WRITE (ITAPEW,900) QQDWW, (VQDW(I),I=1,3)                         REDMOD    49
      WRITE (ITAPEW,901)                                                REDMOD    50
C                                                                       REDMOD    51
      DO 100 M=1,NQ                                                     REDMOD    52
C                                                                       REDMOD    53
C     LOCATE AND READ ON-DIAGONAL GENERALIZED-FORCE TERMS               REDMOD    54
C     FROM INTERMEDIATE I/O UNIT (CF. QINTP)                            REDMOD    55
C                                                                       REDMOD    56
      IF (M.EQ.1)  GO TO 50                                             REDMOD    57
      DO 40 I=1,NQ                                                      REDMOD    58
```

```
      DO 30 J=1,2
      READ (ITAPE) (QQ(K,J),K=1,NX)
   30 CONTINUE
   40 CONTINUE
   50 DO 60 J=1,2
      READ (ITAPE) (QQ(K,J),K=1,NX)
   60 CONTINUE
C
C     INTERPOLATE FOR GENERALIZED FORCES AT DESIRED VELOCITIES
C     (ASSUMING NO MODAL FREQUENCY SHIFT WITH AIRSPEED)
C
      DEL = DELYES
      DO 70 I=1,3
      N = I
      VBOTST = VQDW(I) * 1.69 / (BR * OMG(M))
      LLL = LL
      IF (VBOTST.LT.X(1).OR.VBOTST.GT.X(NX))
     1   LLL = MINO(3,LL)
      IF (VBOTST.LT.10.0)  GO TO 65
      DO 63 K1=1,NX
      K2 = NX - K1 + 1
      DO 62 J=1,2
      QQK(K2,J) = QQ(K1,J) * XK(K2) * XK(K2)
   62 CONTINUE
   63 CONTINUE
      TSTK = 1.0 / VBOTST
      CALL HELGX (TSTK,QTST,XK,QQK,NX,2,LLL,2,NF,0,0)
      GO TO 68
   65 CONTINUE
      CALL HELGX (VBOTST,QTST,X,QQ,NX,2,LLL,2,NF,0,0)
   68 CONTINUE
C
C     PERFORM TEST AND SET CLUES FOR ROUTINE CONV
C
      CQTST = CMPLX (QTST(1,1),QTST(2,1))
      IF (VBOTST.LT.10.0)  GO TO 69
      CQTST = CQTST * VBOTST * VBOTST
   69 CONTINUE
      AQTST = CABS(CQTST)*RHO
      QDWTST = AQTST/WW(M,M)
      IF (QDWTST.GT.QQDWW)  GO TO 75
   70 CONTINUE
      NOMI = NOMI + 1
      NIND(NOMI) = M
      GO TO 80
   75 DEL = DELNO
   80 CONTINUE
C
      WRITE (ITAPEW,910) M, OMG(M), VQDW(N), AQTST, WW(M,M), QDWTST, DEL
C
  100 CONTINUE
C
      REWIND ITAPE
C
      NLEFT = NQ - NOMI
      IF (NLEFT.GT.1)  GO TO 300
      WRITE (ITAPEW,1000) NLEFT
```

```
115             STOP                                                               REDMOD     116
          C                                                                        REDMOD     117
            300 CONTINUE                                                           REDMOD     118
          C                                                                        REDMOD     119
            900 FORMAT (1H1/10X,36HMODAL ELIMINATION BASED ON RATIO OF ,          REDMOD     120
120              1        40HGENERALIZED FORCES TO GENERALIZED MASSES,/,10X,       REDMOD     121
                 2        76(1H-),///,10X,16HCUT-OFF RATIO = ,1PE10.3,//,10X,      REDMOD     122
                 3        32HVELOCITIES CHECKED (KNOTS, TAS): ,5(1PE11.3))         REDMOD     123
            901 FORMAT (//,44X,32HDETERMINANT ELEMENT CONTRIBUTION,/,46X,          REDMOD     124
                 1        27HFOR MAXIMUM VELOCITY TESTED,/,30X,9HMAX. VEL.,/,10X,  REDMOD     125
125              2        51HMODE   FREQUENCY     TESTED      GEN. FORCE   GEN. ,  REDMOD     126
                 3        29HMASS        RATIO       DELETED?,/)                   REDMOD     127
            910 FORMAT (10X,I3,1P5E13.3,6X,A4)                                     REDMOD     128
           1000 FORMAT (1H1,5HONLY ,I2,28H MODES LEFT AFTER AUTOMATIC ,            REDMOD     129
                 1        48HREDUCTION OF NUMBER OF MODES BASED ON RATIOS OF /     REDMOD     130
130              2        1X,40HGENERALIZED FORCES TO GENERALIZED MASSES)          REDMOD     131
          C                                                                        REDMOD     132
                RETURN                                                             REDMOD     133
                END                                                                REDMOD     134
```

```
SYMBCLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  REDMOD          1          132

VARIABLES      SN  TYPE            RELOCATION
   457  AQTST      REAL                               REFS       97       106   DEFINED       96
    50  BR         REAL                    COMA       REFS       25        72
   432  CQTST      COMPLEX                            REFS       17        94        96   DEFINED       92       94
   452  DEL        REAL                               REFS      106   DEFINED        69      103
   256  DELNO      REAL                               REFS      103   DEFINED        28
   255  DELYES     REAL                               REFS       69   DEFINED        27
  6200  DETAD      COMPLEX    ARRAY        MODD       REFS       16        21
     0  GK         COMPLEX    ARRAY        FLEXT      REFS       16        22
   446  I          INTEGER                            REFS       46        48        71        72   DEFINED       44       48
                                                        57       70
   435  ITAPE      INTEGER                         DEFINED       31   I/O REFS        35        36        59       63      110
     0  ITAPES     INTEGER    ARRAY        CTAPES     REFS       14        24        30        31
   434  ITAPEW     INTEGER                         DEFINED       30   I/O REFS        48        49       106      114
   450  J          INTEGER                            REFS       59        63      2*80   DEFINED       58       62       79
   451  K          INTEGER                            REFS       59        63   DEFINED        59       63
     0  KZ         INTEGER                 KZERO      REFS       19   DEFINED        41
   443  K1         INTEGER                            REFS       38        39        78        80   DEFINED       37       77
   444  K2         INTEGER                            REFS       39      3*80   DEFINED        38       78
     0  LC         INTEGER    ARRAY        COMA       REFS        9        25        32
     2  LC38       INTEGER                 QELIM      REFS       20
   441  LL         INTEGER                            REFS       73        74   DEFINED        36
   455  LLL        INTEGER                            REFS       84        87   DEFINED        73       74
   447  M          INTEGER                            REFS       56        72      2*97       101    4*106
                                                   DEFINED       51
   453  N          INTEGER                            REFS      106   DEFINED        71
 17550  NC         INTEGER                 MODD       REFS       21
   440  NF         INTEGER                            REFS       84        87   DEFINED        36
```

```
VARIABLES      SN  TYPE              RELOCATION
      1  NIND        INTEGER    ARRAY    FITR         REFS        10       23   DEFINED      101
      0  NLEFT       INTEGER             F.P.         REFS       113      114   DEFINED        1      112
      0  NOMI        INTEGER             FITR         REFS        23      100      101      112   DEFINED       33      100
    436  NQ          INTEGER                          REFS        51       57      112  DEFINED       32
    442  NQR       * INTEGER                       DEFINED        36
    437  NX          INTEGER                          REFS        37       38       59       63       74       77       78
                                                        84        87  DEFINED       36
   6200  OMG         REAL       ARRAY    FLEXT        REFS        10       22       72      106
  17500  OMM         REAL       ARRAY    MODD         REFS        10       21
      0  Q           COMPLEX    ARRAY    MODD         REFS        16       21
    460  QDWTST      REAL                             REFS        98      106   DEFINED       97
    500  QQ          REAL       ARRAY                 REFS        11       80       87  DEFINED       59       63
      0  QQDWW       REAL                QELIM        REFS        20       48       98
    542  QQK         REAL       ARRAY                 REFS        12       84   DEFINED       80
    536  QTST        REAL       ARRAY                 REFS        11       84       87     2*92
   6250  RHO         REAL                FLEXT        REFS        22       96
    456  TSTK        REAL                             REFS        84  DEFINED       83
   6251  VB          REAL                FLEXT        REFS        22
    454  VBOTST      REAL                             REFS      2*74       76       83       87       93     2*94
                                                   DEFINED        72
    445  VC          REAL                             REFS        45       46   DEFINED       43       45
    600  VQDW        REAL       ARRAY                 REFS        13       48       72      106  DEFINED       46
      1  VQQDWW      REAL                QELIM        REFS        20       46
  14400  WW          REAL       ARRAY    MODD         REFS        10       21       97      106
    461  X           REAL       ARRAY                 REFS        11       39     2*74       87  DEFINED       36
      1  XK          REAL       ARRAY    KZERO        REFS        12       19     2*80       84  DEFINED       39
         VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
         CABS      REAL      1 LIBRARY      96
         HELGX              11              84        87

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE   REFERENCES
         CMPLX     COMPLEX   2  INTRIN                 92
         MINO      INTEGER   0  INTRIN                 74

STATEMENT LABELS              DEF LINE   REFERENCES
      0  10                        40          37
      0  20                        47          44
      0  30                        60          58
      0  40                        61          57
     65  50                        62          56
      0  60                        64          62
      0  62                        81          79
      0  63                        82          77
    147  65                        86          76
    151  68                        88          85
    160  69                        95          93
      0  70                        99          70
    176  75                       103          98
    200  80                       104         102
      0  100                      108          51
    223  300                      117         113
    327  900      FMT             119          48
    353  901      FMT             123          49
    377  910      FMT             127         106
    403  1000     FMT             128         114
```

```
LOOPS  LABEL   INDEX     FROM-TO    LENGTH    PROPERTIES
   21   10      K1        37 40        5B       INSTACK
   33   20      I         44 47        4B       INSTACK
   45   100     M         51 108     147B               EXT REFS  NOT INNER
   50   40      I         57 61       15B               EXT REFS  NOT INNER
   51   30      J         58 60       12B               EXT REFS
   66   60      J         62 64       12B               EXT REFS
  102   70      I         70 99       70B               EXT REFS    EXITS   NOT INNER
  121   63      K1        77 82       21B               NOT INNER
  134   62      J         79 81        3B       INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       KZERO        16               0 KZ       (1)               1 XK       (15)
       QELIM         3               0 QQDWW    (1)               1 VQQDWW (1)               2 LC38     (1)
       MODD       8041               0 Q        (3200)         3200 DETAD  (3200)         6400 WW       (1600)
                                  8000 OMM      (40)           8040 NC       (1)
       FLEXT      3242               0 GK       (3200)         3200 OMG      (40)          3240 RHO      (1)
                                  3241 VB       (1)
       FITR         41               0 NOMI     (1)               1 NIND     (40)
       CTAPES       50               0 ITAPES (50)
       COMA         41               0 LC       (40)             40 BR       (1)

STATISTICS
  PROGRAM LENGTH                  603B      387
  CM LABELED COMMON LENGTH      26252B    11434
          52000B CM USED
```

```
      SUBROUTINE REDVEC (VEC,IVEC)                                      REDVEC     2
C                                                                       REDVEC     3
C     REDUCES NUMBER OF ELEMENTS IN A VECTOR BASED ON                   REDVEC     4
C     NUMBER OF ELEMENTS TO BE ELIMINATED (NOMI)                        REDVEC     5
C     AND THEIR NUMERICAL DESIGNATIONS (NIND)                           REDVEC     6
C                                                                       REDVEC     7
      DIMENSION VEC(IVEC)                                               REDVEC     8
C                                                                       REDVEC     9
      COMMON /FITR/ NOMI,NIND(40)                                       REDVEC    10
C                                                                       REDVEC    11
      NELIM = 0                                                         REDVEC    12
      NEND = IVEC - 1                                                   REDVEC    13
      DO 100 I=1,IVEC                                                   REDVEC    14
      DO 90 J=1,NOMI                                                    REDVEC    15
      IF (NIND(J).NE.I)  GO TO 90                                       REDVEC    16
      NSTART = I - NELIM                                                REDVEC    17
      DO 80 N=NSTART,NEND                                               REDVEC    18
      VEC(N) = VEC(N+1)                                                 REDVEC    19
   80 CONTINUE                                                          REDVEC    20
      NELIM = NELIM + 1                                                 REDVEC    21
      NEND = NEND - 1                                                   REDVEC    22
      GO TO 100                                                         REDVEC    23
   90 CONTINUE                                                          REDVEC    24
  100 CONTINUE                                                          REDVEC    25
      RETURN                                                            REDVEC    26
      END                                                               REDVEC    27
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  REDVEC          1          25

VARIABLES      SN  TYPE           RELOCATION
   40  I           INTEGER                          REFS        15        16    DEFINED        13
    0  IVEC        INTEGER                F.P.      REFS         7        12         13    DEFINED         1
   41  J           INTEGER                          REFS        15   DEFINED         14
   43  N           INTEGER                          REFS      2*18   DEFINED         17
   36  NELIM       INTEGER                          REFS        16        20    DEFINED        11        20
   37  NEND        INTEGER                          REFS        17        21    DEFINED        12        21
    1  NIND        INTEGER     ARRAY      FITR      REFS         9        15
    0  NOMI        INTEGER                FITR      REFS         9        14
   42  NSTART      INTEGER                          REFS        17   DEFINED         16
    0  VEC         REAL        ARRAY      F.P.      REFS         7        18    DEFINED         1        18

STATEMENT LABELS             DEF LINE   REFERENCES
    0  80                       19          17
   30  90                       23          14        15
   33  100                      24          13        22

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   12  100       I           13 24        24B               NOT INNER
   13  90        J           14 23        20B                 EXITS   NOT INNER
   22  80        N           17 19         2B       INSTACK
```

```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      FITR          41                  0 NOMI     (1)                1 NIND    (40)

STATISTICS
  PROGRAM LENGTH                  50B       40
  CM LABELED COMMON LENGTH        51B       41
        52000B CM USED
```

```
                SUBROUTINE NRM2(X,VAL,N)                                        NRM2        2
                DIMENSION X(1)                                                  NRM2        3
                VAL=0.                                                          NRM2        4
                DO 1 I=1,N                                                      NRM2        5
              1 VAL=VAL+X(I)*X(I)                                               NRM2        6
                VAL=SQRT(VAL)                                                   NRM2        7
          C     WRITE(6,11)(X(I),I=1,N),VAL                                     NRM2        8
          C 11  FORMAT('  NRM2 ',/,(6E16.6))                                    NRM2        9
                RETURN                                                          NRM2       10
                END                                                             NRM2       11
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  NRM2          1            9

VARIABLES     SN  TYPE            RELOCATION
   22  I          INTEGER                          REFS       2*5   DEFINED       4
    0  N          INTEGER                  F.P.    REFS       4     DEFINED       1
    0  VAL        REAL                     F.P.    REFS       5           6   DEFINED     1      3      5      6
    0  X          REAL        ARRAY        F.P.    REFS       2         2*5   DEFINED     1

EXTERNALS          TYPE    ARGS       REFERENCES
       SQRT       REAL       1 LIBRARY      6

STATEMENT LABELS              DEF LINE   REFERENCES
    0  1                          5          4

LOOPS   LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   13   1         I            4 5          3B      INSTACK

STATISTICS
  PROGRAM LENGTH                  25B      21
          52000B CM USED
```

```
    1             SUBROUTINE SREVNI(A,M,LOC,MID,NIX)                         SREVNI      2
                  REAL A(MID,1)                                              SREVNI      3
                  INTEGER LOC(1)                                             SREVNI      4
              100 N = M                                                      SREVNI      5
    5             DO 190  K = 1,N                                            SREVNI      6
                  PIVOT = 0.                                                 SREVNI      7
                  DO 120  I = K,N                                            SREVNI      8
                  IF (PIVOT - ABS(A(I,K))) 110,110,120                       SREVNI      9
              110 PIVOT = ABS(A(I,K))                                        SREVNI     10
   10             L = I                                                      SREVNI     11
              120 CONTINUE                                                   SREVNI     12
                  IF (PIVOT) 140,130,140                                     SREVNI     13
              130 NIX = -1                                                   SREVNI     14
                  GO TO 210                                                  SREVNI     15
   15         140 LOC(K) = L                                                 SREVNI     16
                  DO 150  J = 1,N                                            SREVNI     17
                  TEMP1 = A(K,J)                                             SREVNI     18
                  A(K,J) = A(L,J)                                            SREVNI     19
              150 A(L,J) = TEMP1                                             SREVNI     20
   20             TEMP1 = A(K,K)                                             SREVNI     21
                  A(K,K) = 1.                                                SREVNI     22
                  DO 160  J = 1,N                                            SREVNI     23
              160 A(K,J) = A(K,J)/TEMP1                                      SREVNI     24
                  DO 190  I = 1,N                                            SREVNI     25
   25             IF (I - K) 170,190,170                                     SREVNI     26
              170 TEMP1 = -A(I,K)                                            SREVNI     27
                  A(I,K) = 0.                                                SREVNI     28
                  DO 180   J = 1,N                                           SREVNI     29
              180 A(I,J) = A(I,J) + TEMP1*A(K,J)                             SREVNI     30
   30         190 CONTINUE                                                   SREVNI     31
                  DO 200  K = 1,N                                            SREVNI     32
                  NK = N - K                                                 SREVNI     33
                  L = LOC(NK+1)                                              SREVNI     34
                  DO 200  I = 1,N                                            SREVNI     35
   35             TEMP1 = A(I,NK+1)                                          SREVNI     36
                  A(I,NK+1) = A(I,L)                                         SREVNI     37
              200 A(I,L) = TEMP1                                             SREVNI     38
                  NIX = 0                                                    SREVNI     39
              210 RETURN                                                     SREVNI     40
   40             END                                                        SREVNI     41


        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS     DEF LINE     REFERENCES
     3  SREVNI        1            39

 VARIABLES      SN  TYPE          RELOCATION
     0  A           REAL       ARRAY      F.P.     REFS        2       8       9      17      18      20      23
                                                     26     2*29      35      36  DEFINED      1      18      19
                                                     21       23      27      29      36      37
   147  I           INTEGER                        REFS        8       9      10      25      26      27    2*29
                                                     35     2*36      37 DEFINED       7      24      34
   151  J           INTEGER                        REFS       17    2*18      19    2*23    3*29
```

```
VARIABLES     SN  TYPE          RELOCATION
                                                DEFINED       16        22        28
  145  K         INTEGER                          REFS         7         8         9        15        17        18      2*20
                                                  2*21      2*23        25        26        27        29        32
                                                DEFINED        5        31
  150  L         INTEGER                          REFS        15        18        19        36        37
                                                DEFINED       10        33
    0  LOC       INTEGER    ARRAY     F.P.        REFS         3        33   DEFINED         1        15
    0  M         INTEGER              F.P.        REFS         4   DEFINED         1
    0  MID       INTEGER              F.P.        REFS         2   DEFINED         1
  144  N         INTEGER                          REFS         5         7        16        22        24        28        31
                                                    32        34   DEFINED         4
    0  NIX       INTEGER              F.P.      DEFINED        1        13        38
  153  NK        INTEGER                          REFS        33        35        36   DEFINED        32
  146  PIVOT     REAL                             REFS         8        12   DEFINED         6         9
  152  TEMP1     REAL                             REFS        19        23        29        37   DEFINED        17        20
                                                    26        35

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS         REAL      1  INTRIN               8         9

STATEMENT LABELS             DEF LINE   REFERENCES
    0  100         INACTIVE      4
    0  110         INACTIVE      9         2*8
   26  120                      11           7         8
    0  130         INACTIVE     13          12
   33  140                      15        2*12
    0  150                      19          16
    0  160                      23          22
    0  170         INACTIVE     26        2*25
    0  180                      29          28
  110  190                      30           5        24        25
    0  200                      37          31        34
  141  210                      39          14

LOOPS  LABEL     INDEX      FROM-TO    LENGTH    PROPERTIES
   13  190       K            5 30      102B                 EXITS   NOT INNER
   22  120       I            7 11        5B      INSTACK
   44  150       J           16 19        4B      INSTACK
   62  160       J           22 23        3B      INSTACK
   67  190       I           24 30       24B               NOT INNER
  103  180       J           28 29        4B      INSTACK
  116  200       K           31 37       22B               NOT INNER
  131  200       I           34 37        3B      INSTACK

STATISTICS
  PROGRAM LENGTH              167B      119
          52000B CM USED
```

```
      SUBROUTINE QINTP(ITAPE,NQ,NOVBO,VVBO,NRVBO,AM,VBO)
C
C     ******************************************************
C     *      IN THIS VERSION OF ESP, NO GENERALIZED-        *
C     *      FORCE INTERPOLATION TEST IS PERFORMED TO       *
C     *      DETERMINE WHEN A SUFFICIENT NUMBER OF          *
C     *      REFERENCE REDUCED VELOCITIES HAVE BEEN         *
C     *      ESTABLISHED.  INSTEAD, THE NUMBER OF           *
C     *      REFERENCE VELOCITIES IS ALWAYS NRVBO.          *
C     ******************************************************
C
      DIMENSION X(15), VVBO(1), VBO(1)
      DIMENSION LC(40), ITAPES(50)
      DIMENSION QWORK1(3200), QWORK2(3200), QRS(2,2), Q(15,2)
      DIMENSION QK(15,2), XK(15)
C
      COMPLEX QBA(40,40)
C
      EQUIVALENCE (QWORK1(1),QBA(1,1))
C
      COMMON /COMA  / LC,BR
      COMMON / CTAPES/ ITAPES
C
      ITAPEW = ITAPES(6)
      ITAPQ1 = 57
      ITAPQ2 = 58
      ITAPQ3 = 59
      ISIZE = 3200
      NX = NRVBO
      NXMAX = 15
      LL = 4
      NQ2 = 2 * NQ
      NQQ = NQ * NQ
      NQQ2 = 2 * NQQ
      KONS = NQ + NQ/3 - 3*(NQ/3) + 1
C
C     GET ALL ELEMENTS OF GENERALIZED FORCE MATRIX FOR ONE REDUCED
C     VELOCITY INTO ONE RECORD (COLUMN) IN PREPARATION FOR FORMING
C     TRANPOSE AND THEN DOING INTERPOLATION.
C
      REWIND ITAPE
      REWIND ITAPQ1
      DO 60 K1=1,NX
      DO 59 N=1,NQ
      I1 = (N-1)*NQ2 + 1
      I2 = N*NQ2
      READ (ITAPE) (QWORK1(I),I=I1,I2)
   59 CONTINUE
      WRITE (ITAPQ1) (QWORK1(I),I=1,NQQ2)
   60 CONTINUE
      REWIND ITAPE
      REWIND ITAPQ1
C
C     FORM TRANPOSE.  STORE TEMPORARILY ON ITAPQ2.
C
      CALL TRPOSE (ITAPQ1,QWORK1,QWORK2,NQQ2,NX,ITAPQ2,ITAPQ3,ISIZE)
C
```

```
      C     PREPARE FINAL OUTPUT ON ORIGINAL INPUT TAPE, ITAPE.          QINTP     59
      C                                                                  QINTP     60
            REWIND ITAPQ2                                                QINTP     61
            REWIND ITAPE                                                 QINTP     62
            DO 70 I=1,NX                                                 QINTP     63
            X(I) = VVBO(I)                                               QINTP     64
         70 CONTINUE                                                     QINTP     65
            IF (LC(1).EQ.-1)  GO TO 90                                   QINTP     66
      C                                                                  QINTP     67
      C     K METHOD                                                     QINTP     68
      C                                                                  QINTP     69
            DO 171 I=1,NX                                                QINTP     70
            J = NX - I + 1                                               QINTP     71
            XK(J) = 1.0 / X(I)                                           QINTP     72
        171 CONTINUE                                                     QINTP     73
            DO 80 II=1,NOVBO                                             QINTP     74
            ARG = VBO(II)                                                QINTP     75
            LLL = LL                                                     QINTP     76
            IF (ARG.LT.X(1).OR.ARG.GT.X(NX)) LLL=MINO(3,LL)              QINTP     77
            DO 74 K=1,NQQ                                                QINTP     78
            DO 72 I=1,2                                                  QINTP     79
            READ (ITAPQ2) (Q(K1,I),K1=1,NX)                              QINTP     80
            IF (ARG.LT.10.0)  GO TO 72                                   QINTP     81
            DO 172 K1=1,NX                                               QINTP     82
            K2 = NX - K1 + 1                                             QINTP     83
            QK(K2,I) = Q(K1,I) * XK(K2) * XK(K2)                         QINTP     84
        172 CONTINUE                                                     QINTP     85
         72 CONTINUE                                                     QINTP     86
            IF (ARG.LT.10.0)  GO TO 173                                  QINTP     87
            ARGK = 1.0 / ARG                                             QINTP     88
            CALL HELGX (ARGK,QRS,XK,QK,NX,2,LLL,2,NXMAX,0,0)             QINTP     89
            GO TO 174                                                    QINTP     90
        173 CONTINUE                                                     QINTP     91
            CALL HELGX (ARG,QRS,X,Q,NX,2,LLL,2,NXMAX,0,0)                QINTP     92
        174 CONTINUE                                                     QINTP     93
            I = (K-1)/NQ + 1                                             QINTP     94
            J = K - (I-1)*NQ                                             QINTP     95
            QBA(I,J) = CMPLX (QRS(1,1),QRS(2,1))                         QINTP     96
            IF (ARG.LT.10.0)  GO TO 74                                   QINTP     97
            QBA(I,J) = QBA(I,J) * ARG * ARG                              QINTP     98
         74 CONTINUE                                                     QINTP     99
            WRITE (ITAPE) QBA                                            QINTP    100
            IF (LC(10).EQ.0) GO TO 78                                    QINTP    101
            LINE = 8                                                     QINTP    102
            WRITE (ITAPEW,52) AM, VBO(II)                                QINTP    103
            DO 76 I=1,NQ                                                 QINTP    104
            LINE = LINE + KONS                                           QINTP    105
            IF (LINE.LE.62)  GO TO 76                                    QINTP    106
            LINE = 8 + KONS                                              QINTP    107
            WRITE (ITAPEW,52) AM, VBO(II)                                QINTP    108
            WRITE (ITAPEW,34) (QBA(I,J),J=1,NQ)                          QINTP    109
         76 CONTINUE                                                     QINTP    110
         78 CONTINUE                                                     QINTP    111
            REWIND ITAPQ2                                                QINTP    112
         80 CONTINUE                                                     QINTP    113
            RETURN                                                       QINTP    114
      C                                                                  QINTP    115
```

```
          C     P-K METHOD                                                      QINTP     116
          C                                                                     QINTP     117
             90 WRITE (ITAPE) NX,NXMAX,LL,X,NQQ                                 QINTP     118
                DO 94 K=1,NQQ                                                   QINTP     119
                DO 92 I=1,2                                                     QINTP     120
                READ (ITAPQ2) (Q(K1,I),K1=1,NX)                                 QINTP     121
                WRITE (ITAPE) (Q(K1,I),K1=1,NX)                                 QINTP     122
             92 CONTINUE                                                        QINTP     123
             94 CONTINUE                                                        QINTP     124
                RETURN                                                          QINTP     125
          C                                                                     QINTP     126
             34 FORMAT(/( T3,1PE10.3,T15,1PE10.3, T1,2H (,T13,2H, , T25,2H) ,   QINTP     127
               1         T29,1PE10.3,T41,1PE10.3,T27,2H (,T39,2H, , T51,2H)     QINTP     128
               2         T55,1PE10.3,T67,1PE10.3,T53,2H (,T65,2H, , T77,2H) ))  QINTP     129
             52 FORMAT (1H1,5X, 24HSUM OF QRS FOR MACH NO =,F10.3/5X,6HVBO = ,  QINTP     130
               1        F10.3/15X,7HBY ROWS,10X,16H(REAL,IMAGINARY),//)         QINTP     131
          C                                                                     QINTP     132
                END                                                             QINTP     133


        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  QINTP          1         113        124

VARIABLES      SN  TYPE            RELOCATION
    O  AM          REAL                  F.P.       REFS        102       107   DEFINED         1
  520  ARG         REAL                             REFS        2*76       80        86        87        91        96      2*97
                                                 DEFINED         74
  524  ARGK        REAL                             REFS         88   DEFINED        87
   50  BR          REAL                 COMA        REFS         21
  515  I           INTEGER                          REFS         47        49      2*63        70        71        79      2*83
                                                      94         95      2*97       108       120       121
                                                 DEFINED         47        49        62        69        78        93       103
                                                     119
  517  II          INTEGER                          REFS         74       102       107   DEFINED        73
  501  ISIZE       INTEGER                          REFS         56   DEFINED        28
    O  ITAPE       INTEGER               F.P.    DEFINED          1  I/O REFS        41        47        51        61        99
                                                     117        121
    O  ITAPES      INTEGER    ARRAY     CTAPES      REFS         13        22        24
  475  ITAPEW      INTEGER                       DEFINED         24  I/O REFS       102       107       108
  476  ITAPQ1      INTEGER                          REFS         56   DEFINED        25  I/O REFS        42        49        52
  477  ITAPQ2      INTEGER                          REFS         56   DEFINED        26  I/O REFS        60        79       111
                                                     120
  500  ITAPQ3      INTEGER                          REFS         56   DEFINED        27
  513  I1          INTEGER                          REFS         47   DEFINED        45
  514  I2          INTEGER                          REFS         47   DEF:NED        46
  516  J           INTEGER                          REFS         71        95      2*97       108   DEFINED        70        94
                                                     108
  522  K           INTEGER                          REFS         93        94   DEFINED        77       118
  510  KONS        INTEGER                          REFS        104       106   DEFINED        35
  511  K1          INTEGER                          REFS         79        82        83       120       121
                                                 DEFINED         43        79        81       120       121
  523  K2          INTEGER                          REFS        3*83  DEFINED        82
```

```
VARIABLES      SN  TYPE          RELOCATION
    0  LC          INTEGER    ARRAY    COMA          REFS        13        21        65       100
  525  LINE        INTEGER                           REFS       104       105   DEFINED       101       104       106
  504  LL          INTEGER                           REFS        75        76       117   DEFINED        31
  521  LLL         INTEGER                           REFS        88        91   DEFINED        75        76
  512  N           INTEGER                           REFS        45        46   DEFINED        44
    0  NOVBO       INTEGER             F.P.          REFS        73   DEFINED         1
    0  NQ          INTEGER             F.P.          REFS        32      2*33      3*35        44        93        94       103
                                                      108   DEFINED         1
  506  NQQ         INTEGER                           REFS        34        77       117       118   DEFINED        33
  507  NQQ2        INTEGER                           REFS        49        56   DEFINED        34
  505  NQ2         INTEGER                           REFS        45        46   DEFINED        32
    0  NRVBO       INTEGER             F.P.          REFS        29   DEFINED         1
  502  NX          INTEGER                           REFS        43        56        62        69        70        76        79
                                                       81        82        88        91       117       120       121
                                                  DEFINED        29
  503  NXMAX       INTEGER                           REFS        88        91       117   DEFINED        30
15151  Q           REAL       ARRAY                  REFS        14        83        91       121   DEFINED        79       120
  526  QBA         COMPLEX    ARRAY                  REFS        17        19        97        99       108
                                                  DEFINED        95        97
15207  QK          REAL       ARRAY                  REFS        15        88   DEFINED        83
15145  QRS         REAL       ARRAY                  REFS        14        88        91      2*95
  526  QWORK1      REAL       ARRAY                  REFS        14        19        49        56   DEFINED        47
 6745  QWORK2      REAL       ARRAY                  REFS        14        56
    0  VBO         REAL       ARRAY    F.P.          REFS        12        74       102       107   DEFINED         1
    0  VVBO        REAL       ARRAY  . F.P.          REFS        12        63   DEFINED         1
 6726  X           REAL       ARRAY                  REFS        12        71      2*76        91       117
                                                  DEFINED        63
15245  XK          REAL       ARRAY                  REFS        15      2*83        88   DEFINED        71
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       HELGX                11              88        91
       TRPOSE                8              56

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       CMPLX       COMPLEX   2  INTRIN                  95
       MINO        INTEGER   0  INTRIN                  76

STATEMENT LABELS             DEF LINE   REFERENCES
  436  34        FMT            126       108
  456  52        FMT            129       102       107
    0  59                        48        44
    0  60                        50        43
    0  70                        64        62
  157  72                        85        78        80
  210  74                        98        77        96
  252  76                       109       103       105
  255  78                       110       100
    0  80                       112        73
  262  90                       117        65
    0  92                       122       119
    0  94                       123       118
    0  171                       72        69
    0  172                       84        81
  170  173                       90        86
  172  174                       92        89
```

```
LOOPS  LABEL   INDEX     FROM-TO    LENGTH    PROPERTIES
   34  60      K1          43 50       25B              EXT REFS  NOT INNER
   35  59      N           44 48       14B              EXT REFS
   76  70      I           62 64        2B     INSTACK
  106  171     I           69 72        5B     INSTACK
  115  80      II          73 112     145B              EXT REFS  NOT INNER
  127  74      K           77 98       64B              EXT REFS  NOT INNER
  130  72      I           78 85       32B              EXT REFS  NOT INNER
  152  172     K1          81 84        4B     INSTACK
  224  76      I          103 109      31B              EXT REFS  NOT INNER
  240          J          108 108      11B              EXT REFS
  265  94      K          118 123      24B              EXT REFS  NOT INNER
  266  92      I          119 122      21B              EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMA         41               O LC      (40)           40 BR     (1)
       CTAPES       50               O ITAPES (50)

EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       QWORK1     3200               O QBA     (3200)

STATISTICS
  PROGRAM LENGTH               15275B    6845
  CM LABELED COMMON LENGTH       133B      91
        52000B CM USED
```

```
      SUBROUTINE NASTRD(IVERS,IUNIT,IMAT1,IMAT2,IPASS,NDYDOF,NPGDOF,    NASTRD   2
     1                  BUFFER)                                         NASTRD   3
C                                                                       NASTRD   4
C     ROUTINE TO READ MATRICES WRITTEN BY:                              NASTRD   5
C       - MSC NASTRAN WITH EITHER THE SPARSE OR NONSPARSE OPTION,       NASTRD   6
C         OR                                                            NASTRD   7
C       - COSMIC NASTRAN, ASSUMING ALL MATRICES ARE WRITTEN ON SAME     NASTRD   8
C         I/O UNIT, PRECEDED BY FILE REWIND.                            NASTRD   9
C                                                                       NASTRD  10
C     SINGLE-PRECISION INPUT ASSUMED.                                   NASTRD  11
C                                                                       NASTRD  12
C     INPUT CLUES:                                                      NASTRD  13
C       - IVERS - MSC (1) OR COSMIC (2) VERSION OF NASTRAN              NASTRD  14
C       - IUNIT - I/O UNIT CONTAINING MATRIX TO BE READ                 NASTRD  15
C       - IMAT1 - FIRST MATRIX ON I/O UNIT (1), OR SUBSEQUENT           NASTRD  16
C                 MATRIX (2)                                            NASTRD  17
C       - IMAT2 - DYNAMIC FLEXIBILITY MATRIX (1), DYNAMIC MASS          NASTRD  18
C                 MATRIX (2), TRANSFORMATION MATRIX (3), OR PLUG        NASTRD  19
C                 MASS MATRIX (4)                                       NASTRD  20
C       - IPASS - FIRST PASS TO READ HEADER INFORMATION (1), OR         NASTRD  21
C                 SUBSEQUENT PASS TO READ COLUMN OF MATRIX (2).         NASTRD  22
C                                                                       NASTRD  23
      COMMON /CLUEV/ LKLUEV,KLUEV(20)                                   NASTRD  24
C                                                                       NASTRD  25
      DIMENSION  DMAPNM(2), BUFFER(1)                                   NASTRD  26
      DIMENSION  TEMP(220), ITEMP(220)                                  NASTRD  27
C                                                                       NASTRD  28
      EQUIVALENCE (TEMP(1), ITEMP(1))                                   NASTRD  29
C                                                                       NASTRD  30
      IKLUEM = IMAT2 + 6                                                NASTRD  31
      IF (IMAT2.EQ.1.OR.IMAT2.EQ.2)  KLUEMP = KLUEV(IKLUEM)             NASTRD  32
      IF (IMAT2.EQ.3.OR.IMAT2.EQ.4)  KLUEMP = 2                         NASTRD  33
C                                                                       NASTRD  34
C     MSC NASTRAN                                                       NASTRD  35
C                                                                       NASTRD  36
      IF (IVERS.EQ.2)  GO TO 200                                        NASTRD  37
      IF (IPASS.EQ.2)  GO TO 50                                         NASTRD  38
      IF (IPASS.EQ.3)  GO TO 450                                        NASTRD  39
C     READ HEADER INFORMATION                                           NASTRD  40
      IF (IMAT2.NE.4)  REWIND IUNIT                                     NASTRD  41
      READ (IUNIT) NCOL, NROW, IFORM, ITYPE, (DMAPNM(I),I=1,2)          NASTRD  42
      WRITE (6,500) (DMAPNM(I),I=1,2), ITYPE                            NASTRD  43
      WRITE (6,510) NCOL, NROW                                          NASTRD  44
      IF (ITYPE.EQ.1)  GO TO 10                                         NASTRD  45
      WRITE (6,520)                                                     NASTRD  46
      STOP                                                              NASTRD  47
   10 IF (IMAT2.EQ.3.OR.IMAT2.EQ.4)  GO TO 20                           NASTRD  48
      IF (NCOL.EQ.NDYDOF)  GO TO 30                                     NASTRD  49
      WRITE (6,530) NCOL, NDYDOF                                        NASTRD  50
      STOP                                                              NASTRD  51
   20 IF (NCOL.EQ.NPGDOF.AND.IMAT2.EQ.3)  GO TO 30                      NASTRD  52
      IF (NCOL.EQ.NPGDOF.AND.IMAT2.EQ.4)  GO TO 25                      NASTRD  53
      WRITE (6,530) NCOL, NPGDOF                                        NASTRD  54
      STOP                                                              NASTRD  55
   25 IF (NROW.EQ.NPGDOF)  GO TO 40                                     NASTRD  56
      WRITE (6,540) NROW, NPGDOF                                        NASTRD  57
      STOP                                                              NASTRD  58
```

```
   30 IF (NROW.EQ.NDYDOF)  GO TO 40
      WRITE (6,540) NROW, NDYDOF
      STOP
   40 RETURN
C     READ MATRIX BY COLUMNS
   50 DO 60 I=1,NROW
   60 BUFFER(I) = 0.0
      IF (IMAT2.EQ.2)  GO TO 100
C     NONSPARSE OUTPUT4 OPTION
      READ (IUNIT) ICOL, IROWNZ, NW, (TEMP(I),I=1,NW)
      IF (IROWNZ.NE.0)  GO TO 70
      WRITE (6,550)
      STOP
   70 DO 80 I=1,NW
      K = IROWNZ - 1 + I
      BUFFER(K) = TEMP(I)
   80 CONTINUE
      NROWRD = NW
      IF (KLUEMP.EQ.2)  GO TO 150
      RETURN
C     SPARSE OUTPUT4 OPTION
  100 READ (IUNIT) ICOL, ZERO, NW, (TEMP(I),I=1,NW)
      IF (IZERO.EQ.0)  GO TO 110
      WRITE (6,560)
      STOP
  110 NROWRD = 0
      IROWL = 1
  120 LENGTH = ITEMP(IROWL) / 65536
      IROWNZ = ITEMP(IROWL) - LENGTH*65536
      NROWNZ = LENGTH - 1
      NROWRD = NROWRD + NROWNZ
      DO 130 I=1,NROWNZ
      K = IROWNZ - 1 + I
      BUFFER(K) = TEMP(IROWL+I)
  130 CONTINUE
      IROWL = IROWL + LENGTH
      IF (IROWL.LT.NW)  GO TO 120
      IF (KLUEMP.EQ.1)  RETURN
C     FIRST NONZERO ROW
      LENGTH = ITEMP(1) / 65536
      IROWNZ = ITEMP(1) - LENGTH*65536
C     PRINT COLUMN
  150 WRITE (6,570) ICOL
      WRITE (6,580) IROWNZ
      WRITE (6,590) NROWRD
      WRITE (6,600) (BUFFER(K),K=1,NROW)
      RETURN
C
C     COSMIC NASTRAN
C
  200 IF (IPASS.EQ.2)  GO TO 300
      IF (IPASS.EQ.3)  GO TO 400
      IF (IMAT1.NE.1)  GO TO 220
C     SKIP HEADER INFORMATION ASSOCIATED WITH FILE REWIND
      DO 210 I=1,8
  210 READ (IUNIT)
C     READ SELECTED VARIABLES FROM MATRIX HEADER INFORMATION
```

```
  220 READ (IUNIT)
      READ (IUNIT) AMATNM
      READ (IUNIT)
      READ (IUNIT)
      READ (IUNIT) NDUM, NCOL, NROW
      DO 230 I=1,3
  230 READ (IUNIT)
      WRITE (6,610) AMATNM
      WRITE (6,510) NCOL, NROW
      IF (IMAT2.EQ.3.OR.IMAT2.EQ.4)  GO TO 240
      IF (NCOL.EQ.NDYDOF)  GO TO 250
      WRITE (6,530) NCOL, NDYDOF
      STOP
  240 IF (NCOL.EQ.NPGDOF.AND.IMAT2.EQ.3)  GO TO 250
      IF (NCOL.EQ.NPGDOF.AND.IMAT2.EQ.4)  GO TO 245
      WRITE (6,530) NCOL, NDYDOF
      STOP
  245 IF (NROW.EQ.NPGDOF)  GO TO 260
      WRITE (6,540) NROW,NPGDOF
      STOP
  250 IF (NROW.EQ.NDYDOF)  GO TO 260
      WRITE (6,540) NROW, NDYDOF
      STOP
  260 ICOL = 0
      RETURN
C     READ MATRIX BY COLUMNS
  300 READ (IUNIT)
      READ (IUNIT) NROW
      READ (IUNIT) (BUFFER(I),I=1,NROW)
      IF (KLUEMP.EQ.1)  RETURN
C     PRINT COLUMN
      ICOL = ICOL + 1
      WRITE (6,570) ICOL
      WRITE (6,590) NROW
      WRITE (6,600) (BUFFER(I),I=1,NROW)
      RETURN
C
C     SKIP MATRIX TRAILER INFORMATION
C
  400 READ (IUNIT)
  450 READ (IUNIT)
      RETURN
C
  500 FORMAT (1H1,9X,27HREADING MSC NASTRAN MATRIX ,2A4,
     1        /13X,6HTYPE =,I2)
  510 FORMAT (13X,20HNUMBER OF COLUMNS = ,I3,
     1        /13X,20HNUMBER OF ROWS    = ,I3)
  520 FORMAT (1X,49HMATRIX TYPE IS INCONSISTENT WITH ESP REQUIREMENTS,
     1        //1X,35HTYPE MUST BE REAL, SINGLE-PRECISION)
  530 FORMAT (1X,37HNUMBER OF COLUMNS IN NASTRAN MATRIX (,I3,
     1        22H) IS INCONSISTENT WITH/1X,21HNUMBER OF DEGREES OF ,
     2        37HFREEDOM SPECIFIED IN ESP INPUT DATA (,I3,1H))
  540 FORMAT (1X,34HNUMBER OF ROWS IN NASTRAN MATRIX (,I3,
     1        22H) IS INCONSISTENT WITH/1X,21HNUMBER OF DEGREES OF ,
     2        37HFREEDOM SPECIFIED IN ESP INPUT DATA (,I3,1H))
  550 FORMAT (1X,44HMATRIX BEING READ WAS PREPARED USING SPARSE ,
     1        14HOUTPUT4 OPTION/1X,30HBUT SHOULD HAVE BEEN NONSPARSE)
```

```
        560 FORMAT (1X,47HMATRIX BEING READ WAS PREPARED USING NONSPARSE ,     NASTRD    173
           1        14HOUTPUT4 OPTION/1X,27HBUT SHOULD HAVE BEEN SPARSE)       NASTRD    174
        570 FORMAT (//15X,15HREADING COLUMN ,I3)                               NASTRD    175
        580 FORMAT (15X,20HFIRST NONZERO ROW = ,I3)                            NASTRD    176
        590 FORMAT (15X,22HNUMBER OF ROWS READ = ,I3/)                         NAST:D    177
        600 FORMAT (1P10E12.4)                                                 NASTRD    178
        610 FORMAT (1H1,9X,30HREADING COSMIC NASTRAN MATRIX ,A10)              NASTRD    179
      C                                                                        NASTRD    180
            END                                                                NASTRD    181
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  NASTRD           1          61        77        95       104       139       144       150       156

VARIABLES        SN  TYPE              RELOCATION
  1011  AMATNM      REAL                              REFS       122   DEFINED       116
     0  BUFFER      REAL        ARRAY       F.P.      REFS        25       103       149   DEFINED         1        64        73
                                                        91       143
  1347  DMAPNM      REAL        ARRAY                 REFS        25        42   DEFINED        41
   776  I           INTEGER                           REFS        41        42        64        67        72        73        79
                                                        90        91       143       149   DEFINED        41        42        63
                                                        67        71        79        89       112       120       143       149
   777  ICOL        INTEGER                           REFS       100       146       147   DEFINED        67        79       138
                                                       146
   774  IFORM     * INTEGER                        DEFINED        41
   770  IKLUEM      INTEGER                           REFS        31   DEFINED        30
     0  IMAT1       INTEGER                 F.P.      REFS       110   DEFINED         1
     0  IMAT2       INTEGER                 F.P.      REFS        30      2*31      2*32        40      2*47        51        52
                                                        65     2*124       128       129   DEFINED         1
     0  IPASS       INTEGER                 F.P.      REFS        37        38       108       109   DEFINED         1
  1006  IROWL       INTEGER                           REFS        85        86        91        93        94
                                                   DEFINED        84        93
  1000  IROWNZ      INTEGER                           REFS        68        72        90       101   DEFINED        67        86
                                                        98
  1013  ITEMP       INTEGER     ARRAY                 REFS        26        28        85        86        97        98
   775  ITYPE       INTEGER                           REFS        42        44   DEFINED        41
     0  IUNIT       INTEGER                 F.P.   DEFINED         1   I/O REFS       40        41        67        79       113
                                                       115       116       117       118       119       121       141       142
                                                       143       154       155
     0  IVERS       INTEGER                 F.P.      REFS        36   DEFINED         1
  1005  IZERO     * INTEGER    *UNDEF                 REFS        80
  1002  K           INTEGER                           REFS        73        91       103   DEFINED        72        90       103
   771  KLUEMP      INTEGER                           REFS        76        95       144   DEFINED        31        32
     1  KLUEV       INTEGER     ARRAY       CLUEV     REFS        23        31
  1007  LENGTH      INTEGER                           REFS        86        87        93        98   DEFINED        85        97
     0  LKLUEV      INTEGER                 CLUEV     REFS        23
   772  NCOL        INTEGER                           REFS        43        48        49        51        52        53       123
                                                       125       126       128       129       130   DEFINED        41       119
  1012  NDUM      * INTEGER                        DEFINED       119
     0  NDYDOF      INTEGER                 F.P.      REFS        48        49        58        59       125       126       130
                                                       135       136   DEFINED         1
     0  NPGDOF      INTEGER                 F.P.      REFS        51        52        53        55        56       128       129
```

```
VARIABLES     SN  TYPE          RELOCATION
                                             132      133   DEFINED      1
  773  NROW       INTEGER                   REFS       43       55      56      58      59      63     103
                                             123      132      133     135     136     143     148     149
                                         DEFINED       41      119     142
 1010  NROWNZ     INTEGER                   REFS       88       89 DEFINED      87
 1003  NROWRD     INTEGER                   REFS       88      102 DEFINED      75      83      88
 1001  NW         INTEGER                   REFS       67       71      75      79      94
                                         DEFINED       67       79
 1013  TEMP       REAL        ARRAY         REFS       26       28      73      91 DEFINED      67      79
 1004  ZERO     * REAL                   DEFINED       79

FILE NAMES       MODE
       TAPE6     FMT               WRITES     42       43       45      49      53      56      59      69
                                       81    100      101      102     103     122     123     126     130
                                      133    136      147      148     149
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS             DEF LINE    REFERENCES
   45  10                       47          44
   56  20                       51          47
   70  25                       55          52
   75  30                       58          48      51
  102  40                       61          55      58
  103  50                       63          37
    0  60                       64          63
  126  70                       71          68
    0  80                       74          71
  143  100                      79          65
  156  110                      83          80
  160  120                      85          94
    0  130                      92          89
  211  150                     100          76
  225  200                     108          36
    0  210                     113         112
  240  220                     115         110
    0  230                     121         120
  274  240                     128         124
  306  245                     132         129
  313  250                     135         125     128
  320  260                     138         132     135
  322  300                     141         108
  350  400                     154         109
  352  450                     155          38
  620  500      FMT            158          42
  627  510      FMT            160          43     123
  636  520      FMT            162          45
  651  530      FMT            164          49      53     126     130
  671  540      FMT            167          56      59     133     136
  711  550      FMT            170          69
  725  560      FMT            172          81
  741  570      FMT            174         100     147
  745  580      FMT            175         101
  751  590      FMT            176         102     148
  756  600      FMT            177         103     149
  761  610      FMT            178         122
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
  107  60       I            63 64         2B     INSTACK
  134  80       I            71 74         3B     INSTACK
  175  130      I            89 92         3B     INSTACK
  233  210      I           112 113        5B              EXT REFS
  253  230      I           120 121        5B              EXT REFS

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CLUEV        21                0 LKLUEV (1)             1 KLUEV  (20)

EQUIV CLASSES   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       TEMP        220                0 ITEMP  (220)

STATISTICS
  PROGRAM LENGTH                1351B      745
  CM LABELED COMMON LENGTH        25B       21
       52000B CM USED
```

6 - REFERENCES

1. Wilkinson, K. et al., "An Automated Procedure for Flutter and Strength Analysis and Optimization of Aerospace Vehicles", AFFDL-TR-75-137, Vols. I and II, December 1975. (Final report for Air Force Flight Dynamics Laboratory contract F33615-72-C-1101)

2. Chipman, R. R., and Malone, J. B., "Study of a Method for Determining Critical Store Configurations for Wing-Store Flutter", Grumman Aerospace Corporation Report No. ADCR-76-1, September 1976. (Final report for Naval Air Systems Command contract N00019-76-C-0160).

3. Chipman, R. R., and Malone, J. B., "Application of Optimization Technology to Wing/Store Flutter Prediction", Journal of Aircraft, Vol. 15, No. 11, November 1978, pp. 786-793.

4. Chipman, R. R. and Laurie, E. J., "Demonstration of a Method for Determining Critical Store Configurations for Wing-Store Flutter", Grumman Aerospace Corporation Report No. ADCR-80-1, May 1980. (Final report for Naval Air Systems Command contract N00019-79-C-0062)

END

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